The Infantry School

MAILING LIST

A compilation of instructional matter prepared at The Infantry School and issued from time to time

Containing the Latest Thought on Infantry

VOLUME XV

Prepared by the Academic Department of the Infantry School under the supervision of the Assistant Commandant

U.S. DISTRIBUTED BY THE BOOK SHOP
THE INFANTRY SCHOOL, FORT BENNING, GEORGIA

8303—BENNING, GA., 1-9-38—4000

PREFACE

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CHAPTER 1

A Tank Battalion at St. Mihiel

(INFANTRY SCHOOL HISTORICAL STUDY)

History written long after an historical event is supposed to be more accurate and reliable owing to the ability of the writer to check his details against many accounts and so paint the correct picture of the situation. In general, this is correct but the process has its faults. Ordinarily the writer is not a participant; consequently he lacks close familiarity with the local scene and the turmoil of battle, and while this may divorce him from any prejudice it also divorces him from many illuminating details.

Thus, in reading a cold analysis of some old time battle often one wonders how much of this is true; how much is merely a general agreement of authorities. For no matter how great the brilliance or erudition of the writer he may still be in error. Because, generally, time has faded the facts, some of them are completely lost, some are so intangible that they die out even in the minds of the participants after a few years, and then, to, the minds of these old contestants do not always react as the writer and his associates of the present do. The facts the historian has may be correct but he has only a portion of them and, perhaps, these are not the most colorful or significant ones. Yet, even a genius may consistently come to wrong conclusions if he has only a portion of the data from which to reason. To be certain of a conclusion, one must have all the data and no military historian ever had all the data. Furthermore, the conventional mili-

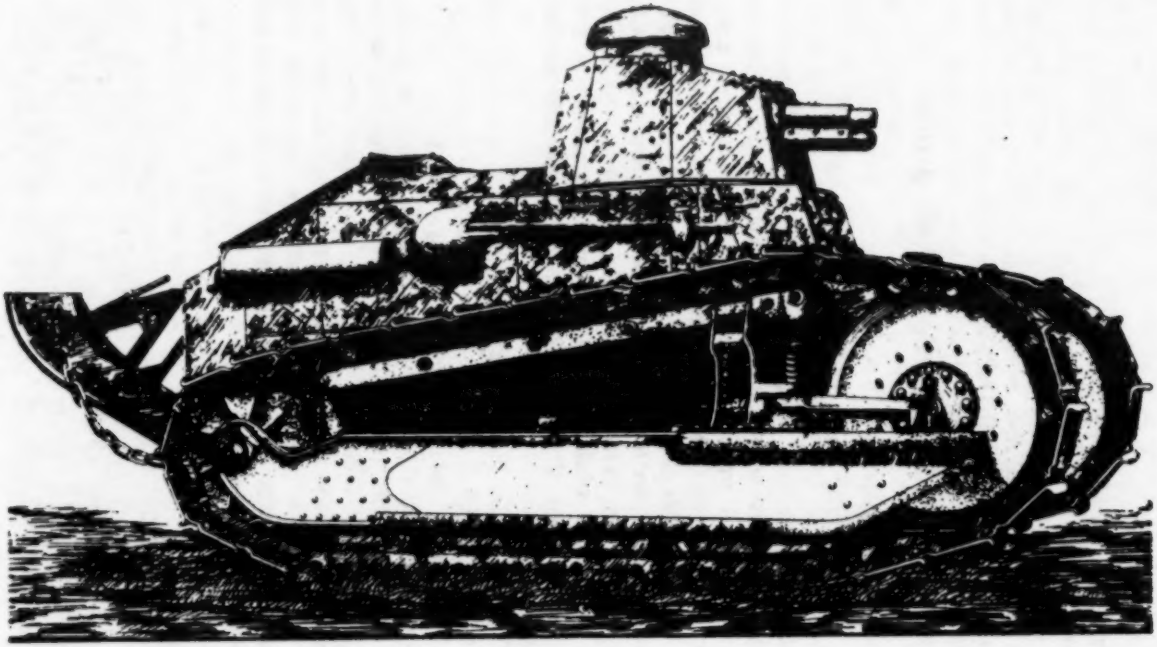

FIGURE 1.—Renault tank.

tary historian has a penchant for ignoring or slighting data that cannot be exactly evaluated. Thus our military history is often misinterpreted and there is no general agreement on any one point. As a consequence, our doctrines are constantly revised and the reputations of great leaders and great events rise and fall with the years. From this we can see why the cynical statement by a wise oldster, *that history is but a series of lies agreed upon*, is not completely unfounded; hence its sting.

For just this once, then, let us put together, out of the mouths of the combatants, an account of one small fragment of battle. We will take the words of the participants written shortly after the battle while the facts were fresh in mind and while the recollection of their own feelings was vivid and strong. There are no second guesses here. It is all raw material. The lessons to be learned, and there are many of them, will, for the most part, be left for the reader to ascertain.

To start let us take up the story of one man and follow him through. He does not know what is coming as methodically he writes his diary.

---

28 August, 1918.

Battalion work all day.

My first bunch of tanks. Twenty-four for Company A arrived at 5:30 this afternoon. The tanks are in excellent shape and extremely well equipped. The men are working like demons and their spirit has gone up 100 percent since they now see that they are to be called for active combat soon.

Studied during the evening.

29 August, 1918.

Started for the front by motor at 5:15 AM accompanied by my three captains. Arrived in the Toul sector at about 11:00 AM and spent the remainder of the day (up to 7:00 PM) looking over the situation for attack. Seems to give us a wonderful opportunity as everything is rather quiet

and apparently the enemy does not know what we are preparing.

Visited and ate dinner with the Gatinois family in St. Amand during the evening. Got back to my station at 3:00 AM the 30th.

30 August, 1918.

Worked with the battalion all day getting equipment in shape. I now have two companies fully equipped and my third will be equipped in a couple of days. It is quite some command when you look it over in its entirety.

Worked on memorandums and orders until late into the night.

31 August, 1918.

Worked with the battalion all morning. Had a demonstration for the benefit of the infantry officers, who will attack with us, during the afternoon.

Worked until late into the night on moves, equipment, etc.

1 September, 1918.

Worked all morning on tank checking.

Had another demonstration during the afternoon, similar to that held yesterday.

We will move into bivouac tomorrow.

2 September, 1918.

Moved into bivouac near our loading station today. The remainder of my tanks came in so my battalion is now complete. We hope to attack real soon, but of course do not exactly know when.

3 September, 1918.

Around checking up all day.

4 September, 1918.

Checking up all day. Learned today that we will attack on the other (south) side of the salient (St. Mihiel).

5 September, 1918.

Started for the front by motor at 2:00 PM and arrived

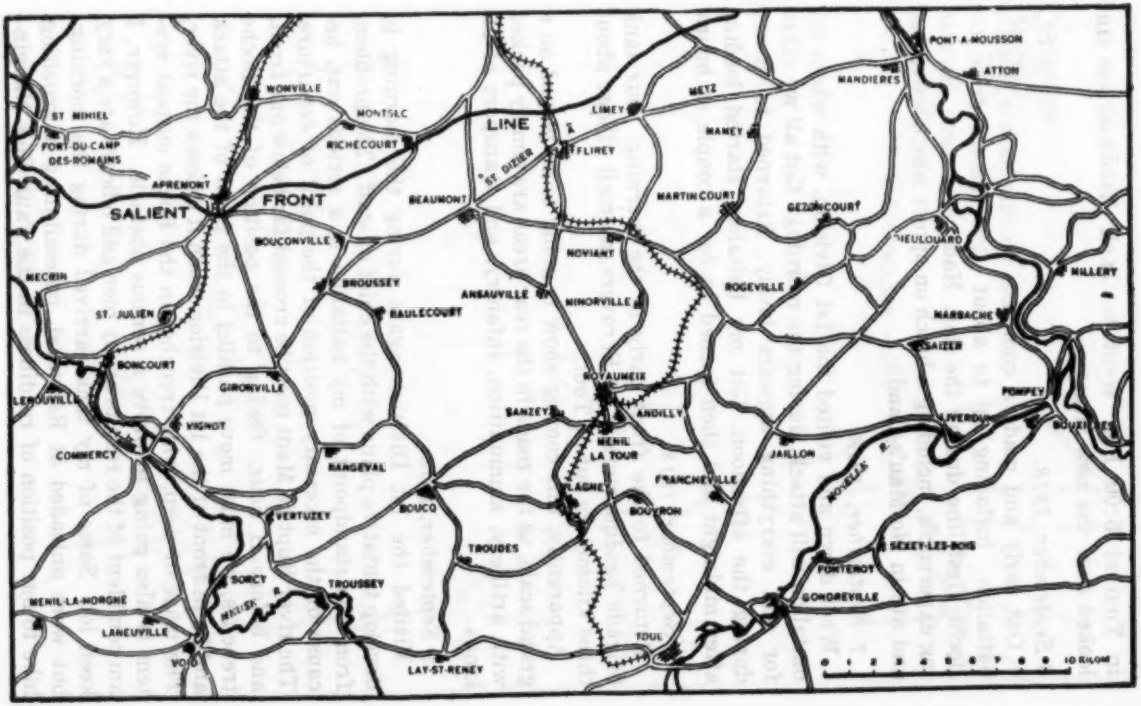

FIGURE 2.—Toul Sector

in Toul at 5:00 PM. Went to Tank Headquarters and looked over the new situation.

6 September, 1918.

Out early and made a complete reconnaissance for the battalion including up to about 100 meters from the Boche first line during the day. Had quite some interesting experences, including a lunch on apples which we picked and ate in No-Man's-Land.

7 September, 1918.

Went down and visited the 1st Division, with whom my battalion will attack, during the morning. Got all we asked for and everything appears lovely. Returned to Bourg during the afternoon. Got my battalion started loading after midnight and then turned in for a couple of hours.

8 September, 1918.

Returned to the front early in the morning. Our tank brigade headquarters is at Ecruvers, a small village about three kilometers out of Toul.

Apparently, this coming show is going to be played on a grand scale, as the roads in the rear areas are simply packed with artillery, ammunition, infantry, and transport of all kinds.

9 September, 1918.

Visited the 1st Division again during the morning to develop tentative plans with the chief of staff. The problem, from the standpoint of my battalion is a serious one, because of the necessary position of the point of departure. The river Rupt de Madt must be crossed far below our front, and before H hour. Owing to the position of the Boche trenches, we must move parallel to the front of the attack and be in front of the 1st Division when it crosses the river. The maze of deep, wide trenches in the Boche outpost system is also going to prove a serious obstacle. However, I am confident of the results as my men and officers are a very keen lot. Some of my tanks arrived during the morning, but were unloaded at Rangeval, necessitating a gruelling hike to our position of readiness in the Faux Bois Naugin-

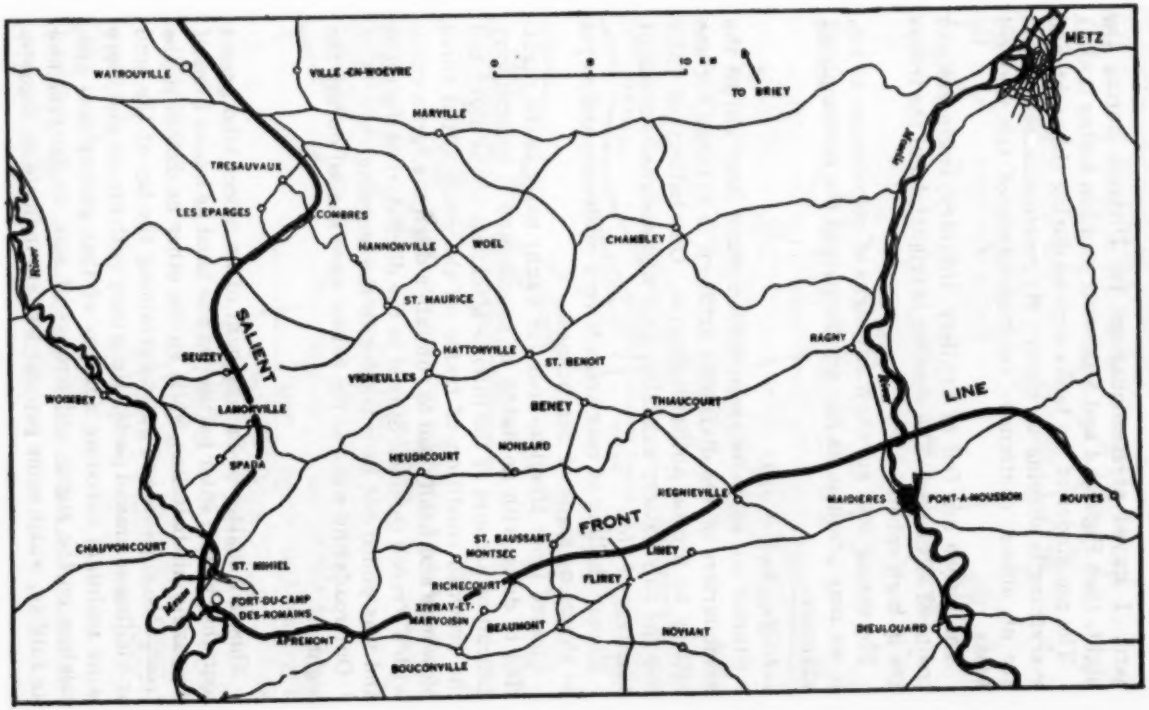

FIGURE 3.—The St. Mihiel Salient.

sard. I stayed at Headquarters 1st Division during the night. (See Figures 4 and 5 showing problem facing tanks.)

The remainder of my tanks arrived during the night, and everything is shaping up nicely. My reconnaissance officers are on almost continuous reconnaissance of the forward areas.

The woods are full of artillery, infantry, engineers and troops of all classes. The weather is frightful, but the troops are in high spirits.

The enemy does not show any signs of nervousness as yet, so we may presume he has not discovered the contemplated offensive.

10 September, 1918.

Started out on more reconnaissance and later visited the headquarters of the divisional artillery to arrange for one battery to fire on antitank targets. One battery of 155's was the only battery available, so it was assigned instead of a battery of 75's.

Enemy shelling of rear areas is very moderate, and as yet he shows no signs of nervousness.

Started from Menil-la-Tour for Pagny early in the night. Had to drive with no lights, of course, and it became very difficult on account of the intense blackness of the night and the crowded condition of traffic on the roads. Had three blow outs and finally had to run into a ditch to avert a crash with a French camion. Stayed in the ditch during the night and was pulled out by a tractor in the morning.

Our roads and some of the towns were shelled during the night.

This is a matter-of-fact account of an officer who knows soon that he will enter battle. On one hand he busies himself preparing his battalion while on the other he dashes to the front. He slips in and out ascertaining the lay of the land or visiting command posts. He is busy with his job and there is no midnight brooding nor any of that philosphical speculation on the rights and wrongs of war, its horrors and its futility, which some popular writers indicate as common

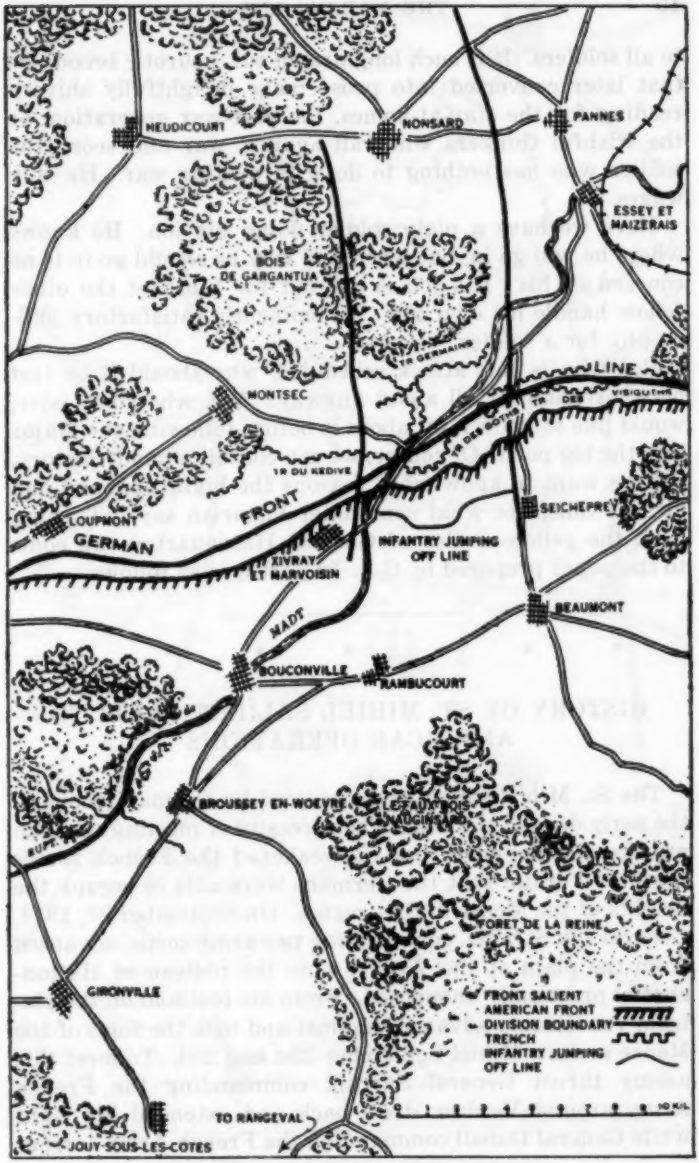

FIGURE 4.—Zone of attack.

to all soldiers. It is such long drawn out, neurotic broodings that later converted into prose make delightfully shivery reading for the stay-at-homes, the post-war generation, or the wishful thinkers who rail against war and scorn the soldier who has nothing to do with making war. He only wages it.

Here we have a plain soldier doing his job. He knows where he will go in, but when and why he should go in is no concern of his. His job is cut out for him; let the other fellow handle his own end. An eminently satisfactory philosophy for a soldier.

But why is this attack scheduled, why should it be just here? What is it all about anyway? We, who come later, would like to know a bit about it before following the Major into the big push. Of course, we can consult a handy history, but we want to know what reasons the high command had at that time, not what some later historian says. Turning back the yellowed files of General Headquarters we come to the paper prepared by G-3. In part it is as follows.

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HISTORY OF ST. MIHIEL SALIENT PRIOR TO AMERICAN OPERATIONS

The St. Mihiel salient was occupied by German troops in the early days of the war. The necessity of meeting German attacks farther north had so weakened the French forces south of Verdun that the Germans were able to occupy the heights of the Meuse in that region. On September 20, 1914, General von Strantz, commanding two army corps, advanced from the plain of the Woevre onto the plateau of Hattonchattel practically unopposed. From his foothold on the plateau, von Strantz advanced against and took the forts of the Meuse and St. Mihiel September 22d and 23d. To meet this enemy thrust General Sarrail, commanding the French Army around Verdun, drew back and extended his right while General Dubail commanding the French Army farther

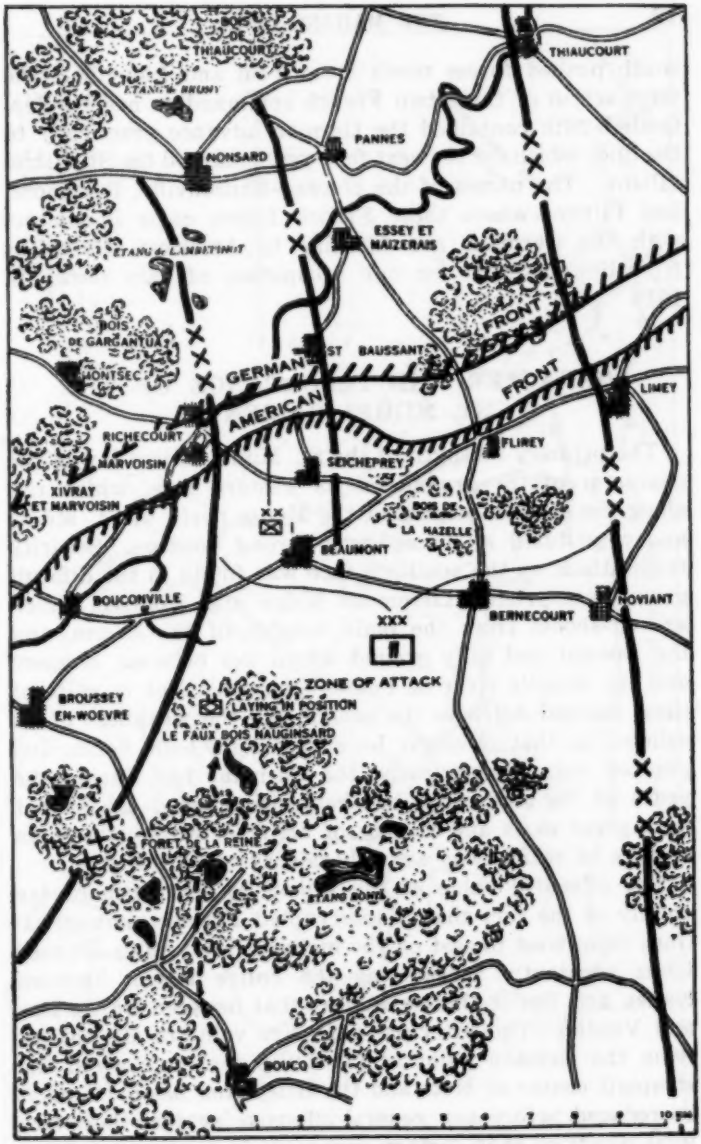

FIGURE 5.—Advance to the front.

south pushed forces north from Toul and Liouville. The joint action of these two French commanders had by September 26th contained the German advance practically to the lines which for the next four years marked the St. Mihiel salient. The names of the places—Bouconville, Beaumont, and Flirey—where these French forces came in contact with the Germans are familiar to American forces as front-line positions on our occupation of this sector in 1918.

* * * * * * *

CHARACTER AND IMPORTANCE OF THE ST. MIHIEL SALIENT

The primary strength of the St. Mihiel salient lay in the character of the ground on its western face, which ran along the eastern heights of the Meuse north of St. Mihiel and constituted an exceedingly strong position. Security from attack on the southern face was found in the difficult ground comprising Loupmont Ridge and Montsec, which are off-shoots from the main heights of the Meuse, and the wooded and hilly ground which lies between Montsec and the Moselle river at Pont-a-Mousson. But in spite of these natural defenses the salient had the weakness of all salients in that it might be attacked on both flanks and pinched out. Consequently, the Germans had during the years of its occupation by them strenghened the salient by a great mass and variety of artificial works, the main feature of which was an elaborate system of wiring.

The offensive value of the salient to the Germans lay chiefly in the fact that it interrupted French communications from west to east on the main railroad Paris—Nancy while constantly threatening the entire region between Nancy and Bar-le-Duc as well as that between Bar-le-Duc and Verdun. The principal defensive value of the salient from the German point of view was that it covered the strategic center of Metz and the Briey iron basin. It must be reduced before any general offensive against these two vital points or even farther east could be contemplated.

[See Figures 6 and 7.]

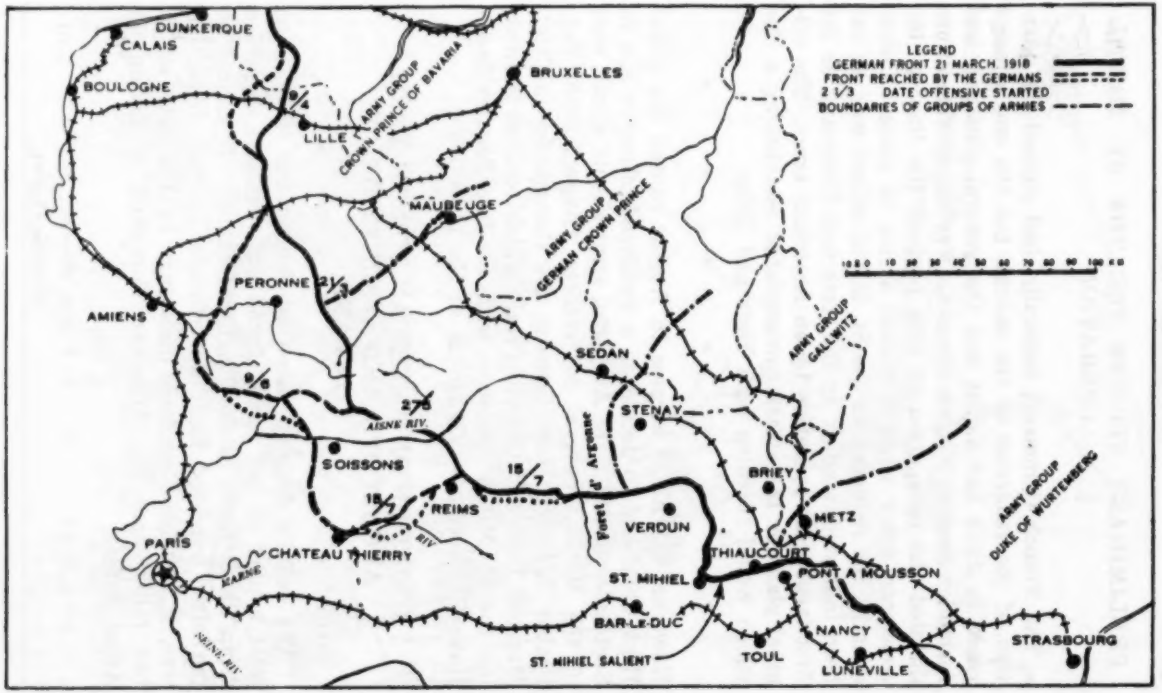

FIGURE 6.—The St. Mihiel salient showing its general relation to the Western Front.

PRELIMINARY STUDIES FOR THE ST. MIHIEL OPERATION

The French Command, naturally, had studied the question of the reduction of the salient, but the one attempt made in 1915 had failed and the general situation had forbidden another French attempt. Various considerations dictated the occupation of this part of the line by the American army when it should arrive in force. Consequently, the reduction of the St. Mihiel salient was, as has been indicated, studied by the American Command as the first large-scale operation by an American army. The original plan for the attack contemplated establishing a line which would threaten both Metz and Briey.

* * * * * * *

However, the Allied success in August caused the Allied High Command to decide on a combined offensive late in September in which the American army should attack west of the Meuse. Several conferences (August 30th, September 2d) were held between the Commander-in-Chief, Marshall Foch and General Petain which resulted in limiting the St. Mihiel operation with the line Regnieville-en-Haye—Thiaucourt—Vigneulles as the objective.

LOCATION OF AMERICAN FORCES FROM AUGUST 9TH AND ASSUMPTION OF COMMAND

The definite decision taken on August 9th to unite at least a part of our forces found our divisions dispersed from Switzerland to the English Channel. It cannot be too often repeated that, unfortunate as this dispersion was, it had been rendered necessary by the duty which had fallen upon the American Command of saving an Allied defeat.

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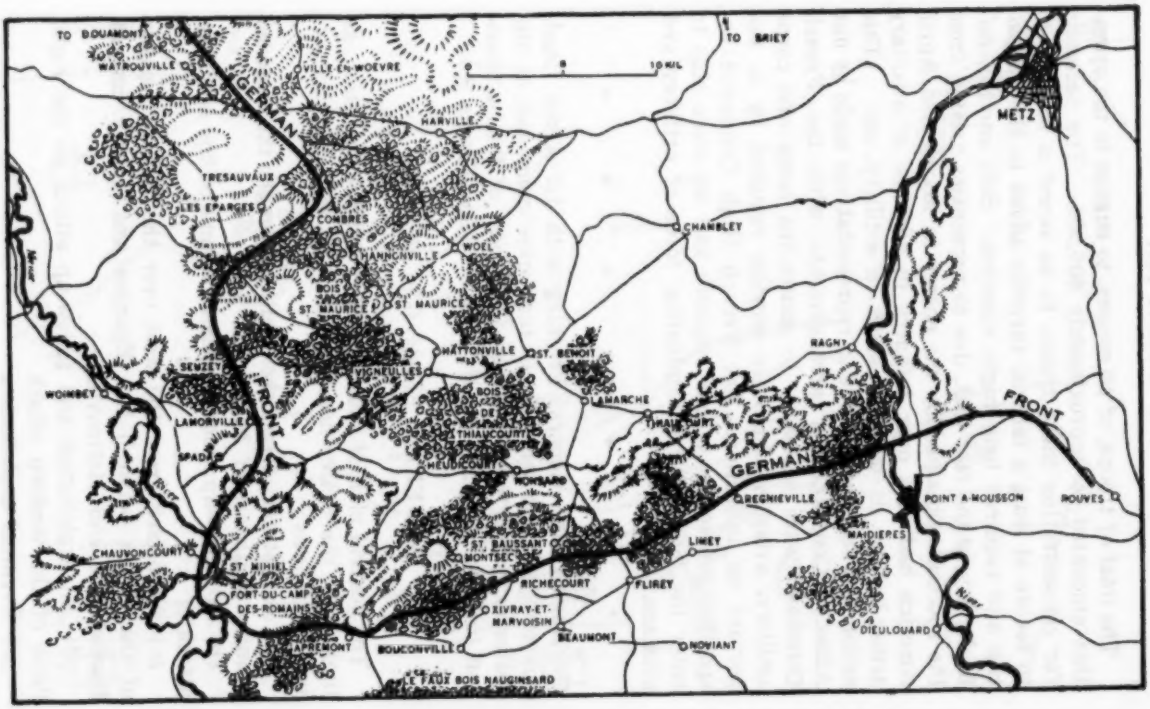

FIGURE 7.—St. Mihiel salient showing its strong features.

The total of troops, of all classes, to engage in the operation amounted to approximately 600,000. The necessity for concentrating these troops in so secret a manner as to secure at least a tactical surprise added to the difficulties and required long night marches. Still another difficulty lay in the fact that, due to necessities arising from the successes obtained by the enemy in March and April, America had sent over infantry in advance of auxiliary arms, leaving us woefully short in artillery, etc. (This action had been largely due to representations made by our Allies.) Consequently, arrangements with the French Command were necessary to secure the army and corps artillery, aviation and other services required by so important an operation. The French High Command responded generously to our requests and we were able to enter the fight with a dominating force of artillery and aviation.

* * * * * * *

On August 30th General Pershing with 1st Army Headquarters at Ligny-en-Barrois took over command of the sector extending from Port-sur-Seille east of Pont-a-Mousson to a point southeast of Verdun. (See Figure 8.)

GENERAL PLAN OF ATTACK

The general plan of attack to carry out the operation, as limited by the conferences August 30th to September 2d, was as follows:

(a) An attack from the south through the wooded country southeast of Vigneulles.

(b) A follow-up atack on the left flank of the southern attack.

(c) An attack from the west over the eastern heights of the Meuse between Les Eparges and Seuzey toward Hannonville and Hattonville.

(d) An exploitation and follow-up attack on the right flank of the western attack.

(e) Eventual exploitation.

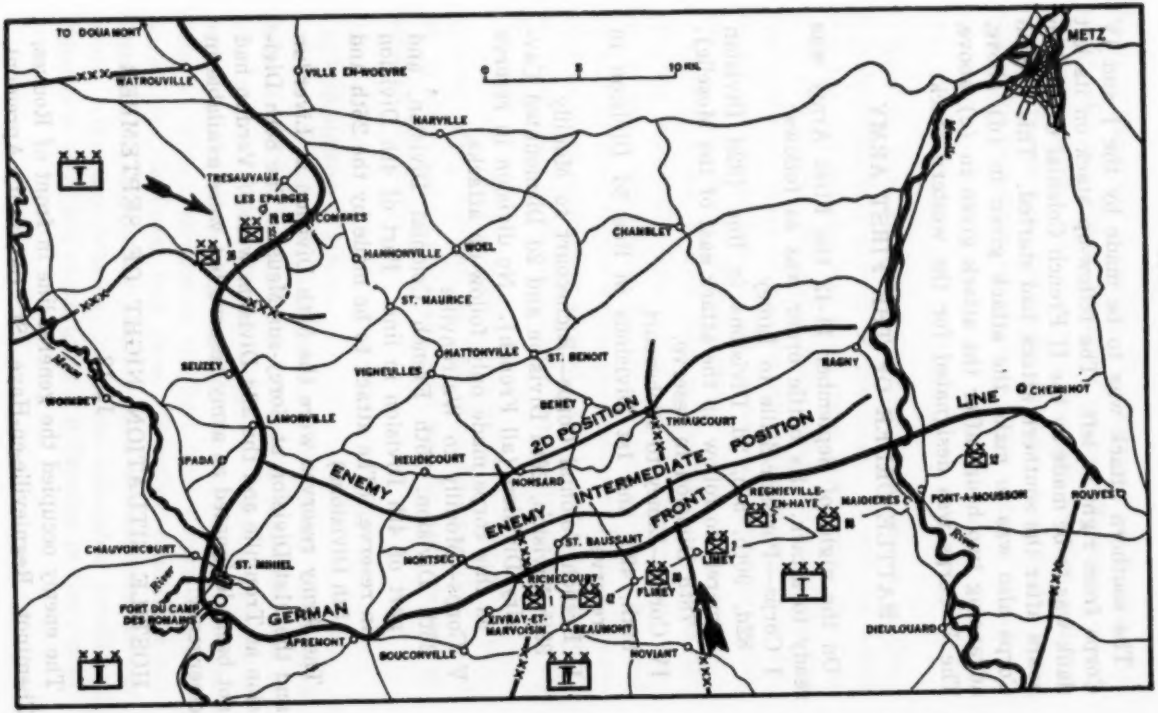

FIGURE 8.—The plan of the attack. Arrows show main effort.

The southern attack was to be made by the I and IV Corps from right to left. The follow-up atack on its left flank was to be made by the II French Colonial Corps two hours after the southern attack had started. This French Corps also was to make the attack given in (d) above, advancing two hours after the attack given in (c) above. The V Corps was designated for the western atack.

BATTLE ORDER OF THE FIRST ARMY

On the night of September 11-12 the First Army was ready to attack. Its battle order was as follows:

I Corps—Port-sur-Seille to Limey

82d, 90th, 5th, 2d Divisions in line (82d Division merely to follow up the attack east of the Moselle). 78th Division in reserve.

IV Corps—Limey to Richecourt

89th, 42d, and 1st Divisions in line 3d Division in reserve.

II French Colonial Corps—Richecourt to Mouilly

39th Division, 26th Division and 2d Dismounted Cavalry Division (all French). No division in reserve as this corps made only follow-up attacks.

V Corps—Mouilly to Watronville

26th Division, 15th French Colonial Division, and part of 4th Division in line. Part of 4th Division in reserve. (The attack to be made by the 26th and 15th Divisions).

The Army reserves were the 35th Division at Liverdun and the 91st Division at Sorcy-sur-Meuse. The 80th Division at Tronville and the 33d Division west of Verdun had not been designated as army reserve but were available in emergency.

HOSTILE SITUATION NIGHT OF SEPTEMBER 11-12

The enemy occupied the general line in front of Rouves, Cheminot, Regnieville-en-Haye, St. Baussant, Apremont,

Fort du Camp des Romains, Chauvoncourt (including city of St. Mihiel), Spada, Seuzey, Combres, Tresauvaux and Ville-en-Woevre. The line was strongly fortified and the enemy's forces were distributed in great depth as the most successful formation in which to meet a great attack.

* * * * * * *

Here we have the broad view of the operation as General Headquarters saw it at the time. It will be noted that the original idea was to go much farther and threaten Metz and Briey. But Allied plans called for curtailing the operations in order to use the American troops in a different operation west of the Meuse—an operation which became that bloody Meuse-Argonne battle.

This furnishes a nice item to speculate on. Was the original American plan better? Fifty years from now the historian will decide, but the decision will be influenced greatly by what nation writes the history and what its current military reputation is, and, in this particular case, is no more likely to be correct than the opinion of the man on the spot.

However, we are mainly interested in one tank commander doing his part in that gigantic operation called St. Mihiel. And to ascertain what was his part we will go back to his diary.

---

11 September 1918.

I started out early this morning to get my orders and maps from the 1st Division. D day is tomorrow and H hour is 5:00 AM. Stayed at my P.C. (a tank tarp hung over some trees) during the afternoon arranging the final details. This afternoon is the first time I have had time to eat for the past two days. Weather conditions are terrible. It is pouring and the mud is nearly up to our knees. We are praying for more favorable conditions tomorrow as it will mean quite a difference in the casualties.

In a downpour, my battalion started to its point of departure (battle positions) at 9:30 PM. The move forward was too macabre to be described in words.

Our chief difficulties were due to other units—infantry, artillery, engineers, etc.—cutting our column. Finally, we struck out across country and reached the crossing over the river at 1:30 AM of the 12th. The whole countryside was swarming with troops, transport, artillery, ammunition, and the like, all moving forward. It was impossible to believe that in the few patches of woods around here so many men and animals could have been hidden from enemy observation during the last few days.

The enemy showed considerable nervousness during the night, and his flares were in the air continuously.

12 September, 1918.

The night of September 11th, up to 1:00 AM September 12th, had been particularly quiet and not a single gun could be heard, although the enemy had his flares in the air continuously. The rain and wind are in our favor as they keep the enemy from hearing the forward movement into battle positions.

Then, out of a death-like stillness, the report of a heavy gun reached us just at 1:00 AM, as the head of my column was crossing the Bouconville-Bernecourt Road. It was a large piece—probably a 9.2-inch or 8-inch and was fired directly behind us, so that the shell screamed directly over our heads. It was the start of our artillery preparation. In the course of a few minutes most of our medium and heavy artillery was in action. The firing was terriffic—the ground shook—the whole countryside lit up with the soft, pink glow of burning powder and the air was full of weird whistlings and shrieks as the shells flew over us. I learned later the terrible effectiveness of this bombardment, and also that over one million shells were fired during the four hours of preparation. With the commencement of our preparation, the enemy showed increased nervousness, indicated by the greater use of signal rockets and

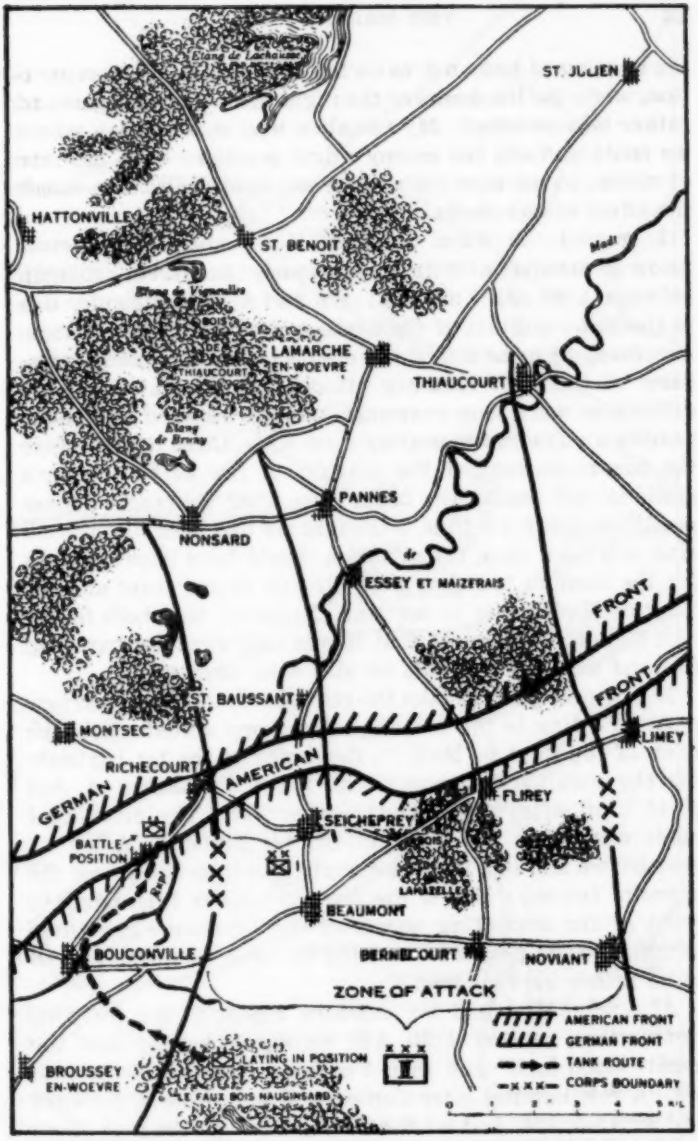

FIGURE 9.—Zone of attack, showing battalion route to position.

the lighting of beacon fires on top of Montsec. The preparation, while the blackness of the night held, was awesome and rather beyond belief. My battalion was in a position where we could enfilade the enemy's first positions with our line of vision, so my men were in an excellent position to watch the effect of our shells.

I crossed the Rupt de Madt River about 500 meters below Bouconville, over a previously prepared crossing, between 1:30 and 2:00 AM. We had a little difficulty due to the soft condition of the banks caused by the heavy rain. However, with the aid of the engineer company and a company of the 18th Infantry attached to the battalion, the difficulties were soon overcome, and we reached our battle positions a few minutes after 2:00 AM—three hours before the commencement of the assault. A few of the enemy's shells landed among the tanks soon after we reached these positions and, for a time, I thought we had been discovered. Had this been true, my situation would have been hopeless for the enemy's trenches were directly to our front and the Rupt de Madt River to our rear. However, the shells finally quit falling. I surmised that it was only random searching fire and was relieved that we still were unlocated.

It was necessary to take the battalion into this precarious position owing to the fact that the enemy actually held the bank of the Rupt de Madt in the sector of the 1st Division, thereby making it impossible to make a crossing at that point until after the assault commenced. The crossing I made was below the sector of the 1st Division. After we crossed, we laid in a little re-entrant and then started up the opposite (enemy) side of the river in time to turn north in front of the assaulting waves of the Division. The three hours in battle positions, waiting to move forward, proved to be rather nervous ones.

At 4:00 AM, I had my captains report to me for final instructions, and at 4:30 AM we shook hands, said the usual "Good luck" and then I ordered Company A to lead out. A few minutes later Company C was ordered forward and at 5:00 AM, just as the rolling barrage crashed down and hundreds of rockets, calling for artillery support, were

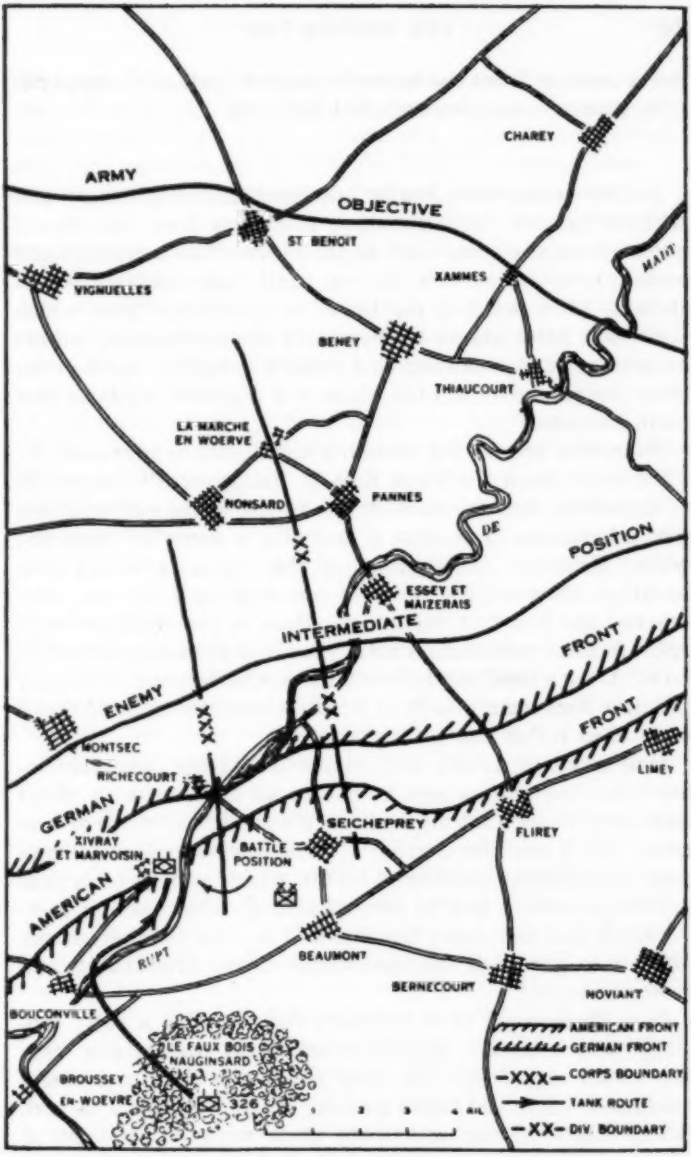

FIGURE 10.—Sketch of tank battle position.

being sent up from the enemy's outpost system, Company B (the support company) started forward.

So the tanks were finally launched matter-of-factly and without heroics. At this time, if at any time, we should have a dramatic scene such as the movies like to picture and certain neurotic writers play up until their readers' nerves shriek. After waiting for hours in a position from which there was little chance to move and where discovery meant an artillery concentration and certain, complete destruction, these people move into the blaze of a gigantic battle as just plain humans.

Note how one of the company commanders expresses it: "The route from the Faux Bois de Nauginsard to the point of departure was the darkest one in the world and with the whole battalion in column it was like a game of 'snap the whip.' However, the thunder of the intense artillery preparation drowned the noise of our approach and we soon reached the point of departure. Here, a few minutes were spent in final preparation amid shouts of good-bye and good-luck. After a final handshake with our battalion commander the first American attack in which American manned tanks were used rolled into action."

One sergeant, acting as a runner, could see—and remember—the humanness and humor in all that went on about him, even at such a time as this. We shall hear more of him later. At H hour he carried a verbal message for the company commander mentioned before which smacks of typical American soldier talk in time of action. The message was:

"Rush like hell down the line and tell my blankety-blank drivers to get their blankety-blank tanks cranked-up and ready to start."

Yes, these were very ordinary fellows with a salty language and a certain mental commonness that makes them kin to all men-folk. Yet they could rise to the greatest heights of valor and think nothing about it—as will be seen later. Their heroic acts were done with no thought of bravery. They just wanted to get a job completed. But they

didn't tell about it. The story must come from someone else. This odd quirk of soldiers has been noted by many writers. But, strange to say, some of these shy fellows in their old age become garrulous, and from a dimming memory create new tales, and so embroider the vest of history. Here, however, we will have a chance to see what happened through many eyes and do this before time fades or history fashions a new pattern.

But more important than this is that we will be able to ascertain how humans react in combat and to note—perhaps with some astonishment—that a mechanized unit is fundamentally a human one.

Accordingly we will pick up the tale as the battalion commander tells it, not forgetting, meanwhile, to remember that other eyes are on him and the action, and perhaps when we have pieced the tale together it will not look as matter-of-fact as he tells it.

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12 September.

The rest of the day was too detailed for description, but the impressions of this first day in the assault will never leave me—the destruction of our artillery—the dead and wounded—the lines of prisoners—the hellish rattle of the opposing machine guns, and the whistling and bursting of shells.

The difficulties my battalion ran into during the morning were heartbreaking—mostly due to the frightful conditions of the trenches in the enemy's outpost system. These trenches were very wide and old, making them veritable tank traps. However, we got through, but left a number of our tanks stalled in the trenches. On account of this unfortunate situation, I threw my support company, Company B, into action early in the morning and arbitrarily used the brigade reserve (16 tanks, which were with me) against orders in the afternoon to attack Nonsard.

Just out of Nonsard, my driver, Lieutenant Carson, and I were slightly wounded about the face and hands by machine-gun bullet splinters entering the tank through the slits. This

was a rather peculiar incident, as I had been on foot nearly all day, and had just climbed into the tank to lead the attack on Nonsard, when it happened. However, neither one of us was really hurt, but rather surprised, so we stayed in action. The action in Nonsard was not stiff but proved a little snappy until the 16th Infantry arrived and took the garrison prisoners. Tanks cannot take prisoners.

The whole action throughout the day proved rather less serious than we expected, but was interesting at points. The details of personal heroism and disregard for danger among my men and officers were too numerous to enumerate—they were wonderful, and I'm mighty proud of the outfit.

We reached our objective for the day about 2:00 PM. I then took my battalion back to my prearranged rendezvous point—some 400 meters behind the front lines—to await the renewal of the advance tomorrow. On arriving at my rendezvous, I immediately set out to bring up supplies and rush the work of unditching the tanks we lost in the morning. Finally got a number of my belated tanks up, but the roads through No-Man's-Land were in such a condition that we could not bring our main supplies up during the night. The only supplies we received were those brought forward on three tank sleds.

My losses today among my men, thank Heaven, have been very light, but I have no complete returns as yet. (Later) I only had two men killed and several officers and men wounded. It seems a miracle they should have come through so fortunately, and I'm mighty thankful.

The weather during the day had been beautiful, but it began to rain again at dusk and the night was miserable. Night came and the artillery moved forward. Very little firing was done by either side through the night. I can see several towns to the west in the enemy's territory burning and hear the flash and noise of exploding ammunition dumps.

So the day came to an end and Nonsard was captured. The Major was pleased with that, though he dismisses it with a phrase. The reader has a feeling that there is more

to this than he has told and wishes, perhaps, that the bald account could be filled out. One cannot expect him to do it, for he is busy with a job. Drama can pass close to him or touch him on the elbow but he would be too occupied to notice.

However, perhaps from other sources we can follow this tanker's path through the day and gain sidelights that will illuminate what happened during the tumult and roar of battle. In the first place, how did the tanks get through the deep wide trench system that General Headquarters saw would be a serious obstacle? From another account we get the following.

". . . Everything went fine until the first enemy trenches were reached. Here it was that the true metal of the tankers was first tested. The trenches proved difficult to negotiate and officers and men had to lead their commands out of momentarily serious situations on foot. Here it was that Captains Weed, Semmes, and English, standing on the parapet of trenches under heavy fire, directed their companies over difficult ground. Here Captain Semmes risked his life to save the life of his driver. When the tank had fallen into the river and sunk, the captain leaped into the water, reentered the tank and dragged the driver to the surface—by the ears, as it happened.

However, all difficulties were quickly overcome and the battalion proceeded with the attack. . . ."

But another officer goes into more detail and indicates the task was no mean one. He says, "my experience included leading the battalion on foot across the German trenches, guiding the tanks on foot, and pulling all the tanks of the platoon out of the positions in which they had become stuck; opening numerous lanes through the enemy wire and through the dense woods for the infantry; bridging an extra wide deep trench by collecting duckboards from its bottom; getting a tank entangled in overhead wire in the woods and having a bad three minutes breaking loose while our barrage, falling short, burnt around me; putting to flight about

a dozen machine-gun crews, causing them to abandon their materiel but without inflicting casualties; getting in a smoke barrage while changing from one sector to another and being nearly blinded by burning particles coming through the slits, leading the tank through the blinding, choking, smoke wave guided by the sound of other clanking tanks, and finally getting out."

By and large, this young lieutenant spent a busy morning. In one pithy paragraph he gives the modern tanker something to think about. How many of his troubles could have been avoided or obviated by using modern fast tanks? Very few it seems. Consequently, a modern tank platoon commander might study this paragraph closely. For though people may argue until the crack of doom whether tanks should be closely or loosely tied to the assaulting infantry, or left foot-loose and free, it matters little to a platoon commander. Tank platoons will eventually strike solid resistance and this resistance will produce problems similar to those laconically mentioned by the tank leader of 1918.

To get a proper picture of this tank battalion in action we must think of all platoons slipping, sliding, squirming in the greasy mud; all commanders, each in his own fashion, meeting and solving problems similar to those of the lieutenant. And then added to this we must envisage the blunt-nosed, ugly, little machines clanking away just ahead of the riflemen, always pushing forward and ranging back and forth in front of the infantry waves like hunting dogs trying to smell out machine-gun nests. But the simile ends there, for, instead of the dogs waiting for the hunter, these mailed terriers pounced on and destroyed their prey.

All this time, every German piece that could be brought to bear on them was firing desperately to stop their advance. For the Germans were wise enough to know that it is no use to try to stop an infantry assault with cannon fire when crawling tanks are reaching out and destroying the machine guns which are the very backbone of the defender's stopping power. Hence the German guns constantly sought to des-

troy any tank within range; the riflemen could be taken care of later.

During all this time what was our battalion commander doing? Again we will have to turn to an eye-witness, the sergeant acting as a runner. He sees things and has a refreshing viewpoint; furthermore, he has a certain humor, often grim, that is typical of American soldiers. Here is his story, in part.

On the afternoon of the 11th when it became known in Headquarters Company of the 326th Battalion that the outfit was to go over the next morning the "Goldbricks" of that organization, numbering sixteen in all, including the writer, loudly clamored with apparently honest zeal to be allowed to take part in the picnic. Our Major had a peculiar habit of taking men at their word. So that afternoon the entire sixteen were equipped with maps of the ground to be taken, given a few necessary instructions, and detailed as a unit of runners to follow the Major's tank; they were all equipped with the official insignia of the runner, a red arm band, so that if at any time during the engagement they should become wearied with the amusement of being shot at, they could depart hastily and boldly for the SOS without being picked up by an MP and herded back to the lines. It should be understood that about the rankest thing there is in this man's army is a big buck private or a noncommissioned officer detailed on duty as a runner at the front. And when such a man is on such duty with the Tank Corps he outranks the German *Gott* himself.

Therefore with the protection of the red arm bands and the knowledge that the Major had strict instructions to keep his tank at least a kilometer behind the lines, it seemed like a nice soft graft with a chance for some excitement and very little danger. In this connection I will say this much for the Major; he complied strictly with those instructions at the start of the fight. But he decided that the tank was too slow for him when at least a kilometer behind the lines, he hopped out calling "follow me" and beat it for a point about

a kilometer ahead of the tanks. Swell huh?

From the jump-off until 7:00 AM that day pandemonium reigned. The American soldier has frequently been heralded in history and fiction as an individual fighter and believe me no one could accuse any member of the 326th Battalion Tank Corps that day of not being a true American. Never before or since has it been the writer's privilege to witness so much individual fighting at one time.

However, this can be said about the tanks. They were all working with the one purpose in view. That purpose was to get as far forward as possible, in the shortest time possible and connect with Heinie even if they had to get out and walk. And that is what the majority of them did. For the tanks after starting out the night before with no (extra) *bidons* of gas on board had only enough left in the morning to run a few kilometers. The Germans had decided to counter our attack on this front by a strategic retreat and the Renaults were never built for prize winning on a speedway.

At the beginning the Major's tank landed in a ditch and stayed there; he hopped out with his pigeon basket and grabbed the next tank in the column. Five minutes more and it was in a ditch; another three minutes and his third tank was tangled up in the ruins of a village. Apparently, thoroughly disgusted with the turn affairs had taken, but secretly quite pleased that he could now disregard his colonel's instructions to stay 1,000 meters behind and direct the fighting, he moved up on foot to the head of the column and of course the runners had to follow. The writer brought up the rear.

About half way across an open field the Major passed by a shell hole and his nostrils caught a peculiar odor. Deciding it was gas he gave the alarm. The writer got his mask on in less than five minutes, but not much less. If there had been any gas there, the great American public would never have the pleasure of reading this story. He there and then decided, at the first opportunity, to take a train for some good reliable gas-school in the SOS and take about three weeks of gas instructions, feeling that he could in this way best protect Uncle Sam's $10,000.00 insurance investment.

Our party travelled rapidly ahead for another fifteen minutes or so and then halted while the Major made a reconnaissance of the terrain and the state of affairs in Jerry's front line, which consisted of a few machine guns and some 77's that he had been unable to haul away, manned by a few men who didn't know any better than to stay there. The writer was sent back to see if any tanks were coming up. About 200 meters back he found eight tanks commanded by Captain Weed in the leading one. Captain Weed had halted his tank and was apparently arguing with himself as to which was the best of several places to cross a trench. The writer by right of the red bandanna wound around his right arm decided for him and led him up to the Major.

The Major, having dispatched these tanks and several others which followed to various points of the line, again moved forward until we reached a shallow trench. One man in the vicinity had his arm half blown off about this time so the Major decided there must be some shrapnel flying about and ordered the detachment down into the trench. A Red Cross stretcher bearer standing thereabout, a fellow about six feet six inches, decided that this taking cover was all foolishness. About thirty seconds later he changed his mind quite rapidly and tried to hide behind a clod of dirt about four inches high. This trench stuff grew too monotonous for the Major in a short time, so he moved on again. Shortly eight reserve tanks, loaned us by the 327th Battalion, arrived and the Major having decided to take an active part in the picnic, secured himself a second lieutenant for a driver, climbed into the tank and started off to hunt up machine-gun nests. We started to follow. The Major ordered us to stay where we were as he was going off on a little personal affair. If some brigadier general had happened along about this time we would probably have been awarded the DSM for the promptness with which we obeyed these instructions. We did more than obey them, we moved back 100 meters and crawled into a shell hole, opened up a couple of cans of corn willy and some hard tack and had lunch. The line had moved so far ahead by this time that

we feared that before the day was over we would lose our 20 percent increase for foreign service.

For a time the Major passes beyond the ken of the runner and ourselves. But we will pick him up again from the tale of a tank driver. However, in order to show St. Mihiel from the driver's seat of a tank and indicate how individual tanks were doing their job it may be interesting to backtrack and include an incident or so that occurred prior to the meeting with the Major. The driver is now talking.

After clearing the zone under bombardment without mishap we straightened out our course and stepped on the gas. All at once we found ourselves among infantry (American). They were in skirmish formation and, after going forward about a quarter of a mile, they began getting down as if they were being held up by fire. An officer with insignia removed came running up to the tank and yelled that a machine gun was holding them up. Before I could get an approximate location from him he ran back to the men who were lying down. I closed my front door and turned around to tell Howard to drive and I would work the 37. I turned just in time to see him disappearing out the back door. He then started running ahead in a stooped position. I started the tank after him. He gained on me and finally dropped down and crawled. I caught up with him and he was pointing to what looked like a brush patch. Thinking he would get into the tank from the rear, I kept going. It was rough travelling as our barrage had destroyed this section and it was hard to see so I pressed my face close to the slits and kept on line with where he had pointed and was right on top of the machine-gun position before I realized it. I hit it, pulled on one of the tractor controls, spun around two or three times under full throttle and then tried to locate Howard, but I could hardly see as the blood was running down over my left eye; my chin seemed to be cut also. I knew it did not amount to much and was wiping it away when Howard ran

up and pounded on the tank and yelled, "Open up—open up", which I did. There was an officer with him and he told me, "I have your names and the Major said to tell you he was recommending you for decoration, both of you." I thanked him.

Howard got into the tank, we cut over to the right and saw some tanks concentrating beneath the brow of a hill and, after crossing over several hills and as many valleys, came up to the rest of the tanks just as our Major was getting ready to make the tank assault on Nonsard. As soon as the Major saw me he jumped into my tank, Howard having gotten out, and we took off ahead of the rest of the tanks. The Major was in a hurry and kept patting the top of my head, which was our signal for full speed ahead. My eye started bleeding again and I could hardly see and kept working the door open and shut with one hand to see. The Major yelled "Shut that door", and I guess that was all that saved both of us for about then the bullets sounded like hail on the tank. I got into a swamp after the Major made me shut the door due to my poor vision and not receiving any signals from him—he was too busy working the 37 shelling Nonsard. We were the pace setters and were far ahead of the rest of the tanks.

For a mile, over any and all kind of terrain, I had the tank wide open, and have wondered to this day how the Major survived that ride. How he kept from getting his brains "busted out" is a mystery. As for myself, I had the brakes to brace myself by, as well as the back support. He had practically nothing; all he did was bang away with the old 37.

I have always gloried in the fact that we captured the damn town by ourselves—at least we were the first in. The Major received some cuts similar to mine, which were caused I found out later by bullet splinters coming in through the slits. We had no face protectors then, such as were issued later on. That night I went over to the dressing station set up in Nonsard and got my cuts dressed and two stitches taken in my chin, also an anti-tetanus serum. I tried to get

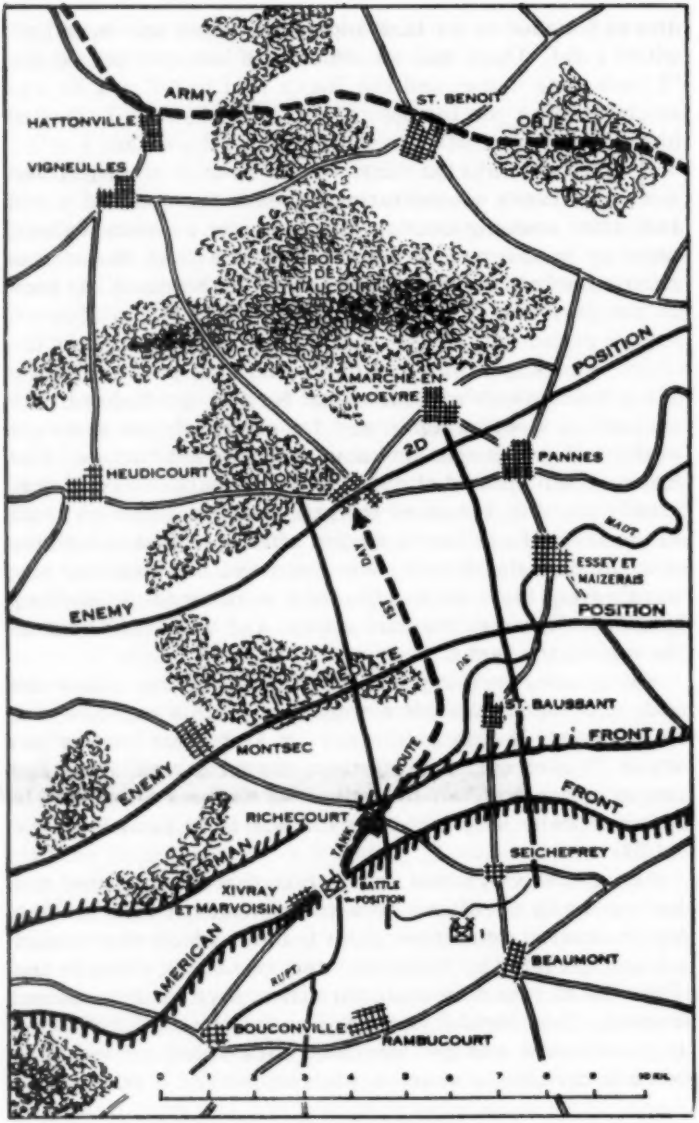

FIGURE 11.—Nonsard and vicinity.

the Major to go over also; but he was busy and would not go, so I got him a bottle of iodine.

That is how a participant saw the attack, but how did the attack appear to an observer, and, moreover, what happened to the group of runners who were left when the Major moved forward? These questions well-up in a person's mind and can be answered, in part, if we take up the account of the runner whom we, and the Major, left well to the rear. The runner continues his tale.

Dinner completed we moved up to locate the Major. After travelling a couple of kilometers we reached the brow of a slight rise just out of Nonsard and sat down to watch the waves of doughboys going by, down the hill and into Nonsard. They came past us in squad columns. The first man in the first wave which passed us had his gun slung and was busy with both hands rolling a cigarette. The next man was busily engaged in carrying a head of cabbage in one hand and feeding himself hardtack with the other. The writer was rather shocked and felt almost called upon to admonish these men for such disgraceful behavior in the face of the enemy. However, probably the enemy in the immediate vicinity was too busy to notice this breach of battlefield etiquette—both of them. Sergeant McGintey took one, and the Major shot the other one out of the church steeple in Nonsard where he was busy firing a machine gun.

Sergeant McGintey's prisoner was a man of apparently sixty years or so who probably had been too tired to run with the rest. Neither the age, sex, or nationality of the Major's victim could be identified, as the Major had made a bull's eye in the center of the target with his little 37. We waited on the brow of the hill until the conquering heroes returned to seek a good camouflaged position for the night. We then held a feast of canned tomatoes, corn willy and hardtack to celebrate the victory.

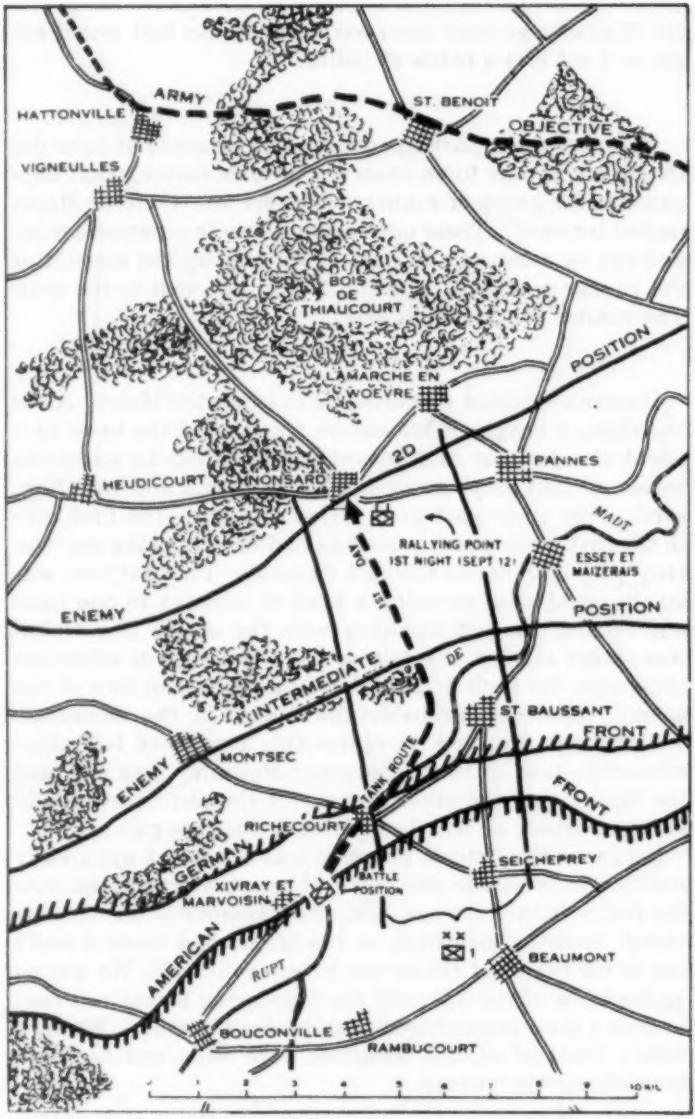

FIGURE 12.—Situation at the end of the first day.

It should be noted that the writer of the above account has a rare faculty for picking up those small human happenings that have a touch of incongruity or humor. The writer is interested in men and how they act, and neither the roar of battle nor the presence of death, can prevent his seeing and remembering the whole mad affair from his own viewpoint. His contribution is important. Nothing is more illuminating regarding the state of American morale and physical condition than his sidelights—the man with the slung rifle calmly rolling a cigarette, the soldier coolly swinging a cabbage head in one hand—his evening salad no doubt —while with the other he carries hardtack which he munches occasionally. There is nothing neurotic, hysterical, or dumb about these American soldiers. They have spent a gruelling day and night; have taken losses, have gone through a day of battle, yet while still in battle formation moving to the assault of their objective they nonchalantly, but shrewdly, take care of their creature comfort. They are a canny, cool crowd.

But while we obtain a good idea of the soldier attitude there is little in the account to tell us just how Nonsard was captured. Turning to another observer, this time a tank company commander, we obtain this succinct statement: "Nonsard was taken by a beautiful flanking and frontal attack of tanks and infantry." There speaks the tactician. But he does not state whether the flanking attack was from the right or left or just how it was conducted. It was a neat piece of work and he admires it, as he would a picture, but the task of getting-up his stalled tanks and running his own show, drives any detailed tactical critique out of his head. Only those at higher headquarters, far, far in the rear, have time, taste, or opportunity for such military thoughts during battle hours.

With the brief quotation above the observer passes on to things which are to him more important and continuing the very same sentence he says, "and that evening was spent some half kilometer back of this village where we were visited by our Colonel and the General, but neither of them brought any gas—that is the kind that can be used in tanks."

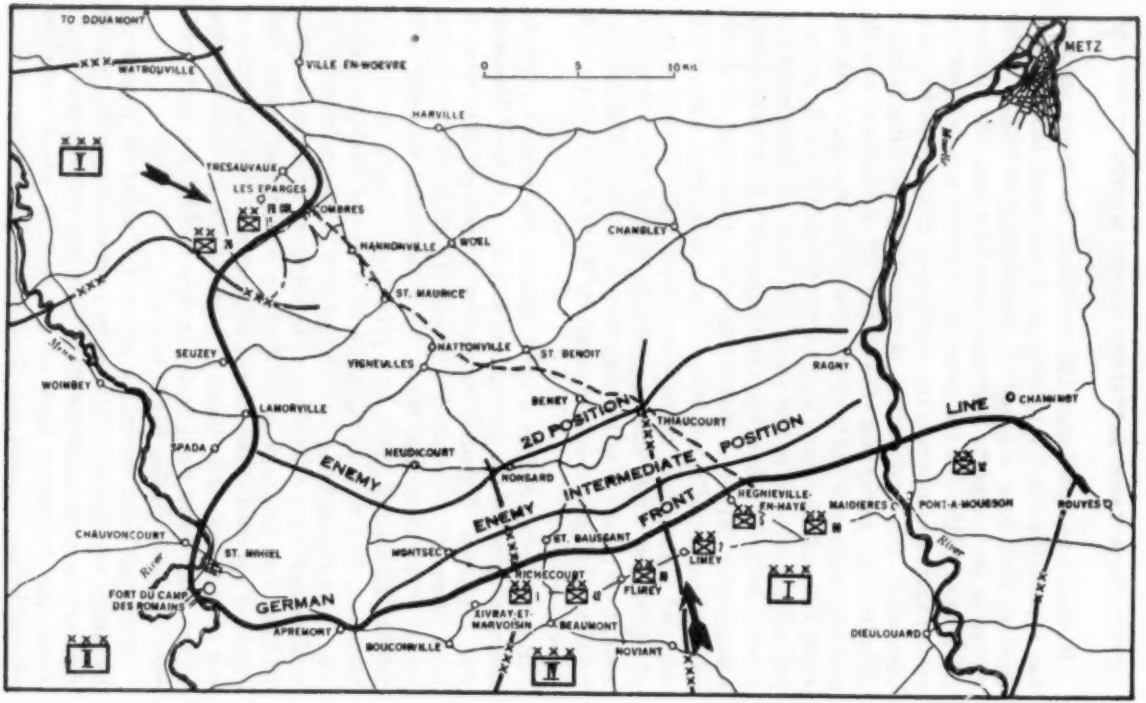

FIGURE 8-A.—Plan of attack and final objective when salient was closed.

By now it is nightfall and it is a good time to return to the Major. He has had a pretty full day, the objective has been taken; but what is he doing now? Let us return to his diary.

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13 September, 1918.

Gas, oil, and other supplies did not arrive during the night on account of road conditions. The roads through No-Man's-Land have had only temporary repairs made on them and the heavy traffic and rain have made them almost impassable. Back in our old rear areas, miles of transport and artillery are waiting on the road to move forward. Regiments of engineers are busy on the roads, and by tomorrow we should be moving faster.

I am greatly disappointed that my supplies did not arrive as it held most of my battalion out of today's fight. I caused all tanks to be drained of gas and oil, and by this method secured sufficient quantities to send seven tanks forward under command of 1st Lieutenant Harry E. Gibbs. These tanks kept up with the attack during the day, but due to the fact that the enemy had retreated during the night of 12th-13th very little resistance was encountered by our forces; therefore the tanks were not called on to do much work.

The St. Mihiel salient was closed by our troops joining at Vigneulles during the night, and then Lieutenant Gibbs conducted his tanks forward as far as Hannonville, where he ran out of gas. Being slightly inside the enemy's lines he chose to take up a defensive position rather than abandon his tanks. However, the Germans were moving rearward too fast to pay any attention to him during the night, and the next morning (the 14th) I relieved him when I took the battalion through the lines. The only compensating feature about having most of my battalion out of action on the 13th was the fact that there was nothing to fight, but everyone in the outfit was very disappointed over the non-arrival of supplies.

But the Major did not sit and wait for supplies to arrive in the normal course of events. Witness what his supply officer has to say:

"Owing to mud and breakdowns I arrived, at 6:00 PM (the 12th), at the rally point, one kilometer south of Nonsard, with only four supply tanks. At 8:00 PM (the 12th) the Major ordered me to go to Menil-la-Tour as fast as I could (meaning on foot), get enough gas and oil for the battalion, have it loaded on trucks, and have them at the rally point by 4:00 AM (the 13th). By hard walking and no rest I arived at Beaumont by midnight and found a captain there with two trucks loaded with gas, oil, and ammunition. It was impossible to get these trucks to the battalion before two o'clock the next afternoon owing to traffic conditions, and then only by getting the colonel in charge of traffic to give these trucks the right of way over all other traffic."

This account indicates that this officer obtained only eighteen hours of sleep in ten days and had one stretch of sixty straight hours without any sleep. The rear echelon was doing its part.

But the difficulties were too great for human accomplishment. The tank brigade commander who was present that day tells of "the long struggle to obtain gasoline for the tanks" and how the day showed "clearly the necessity for having large caterpillar tractors with each tank battalion to carry gasoline across country, since the roads were so congested that it took thirty-two hours to move two trucks of gasoline fourteen kilometers." Those interested in tank logistics will find food for thought here. The tactician will realize the grave danger the immobilized tank battalion was in if the Germans put on a vigorous counterattack about this time.

But to return again to the Major's diary.

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13 September, 1918 (continued)

My supplies finally reached Nonsard at about 4:30 PM. After filling the tanks and making other preparations, my

battalion started for Vigneulles with 37 tanks at 7:00 PM. The hike forward was mostly at night and we came in for a little shelling from German batteries. Just as we were starting from Nonsard a German airman dropped out of the clouds and began to sweep the vicinity with his machine gun.

Arrived at Vigneulles at 1:00 AM the morning of the 14th and went into bivouac near the railroad station. One of my mess sergeants (Sergeant Barnes) who preceded the battalion was waiting for us with a hot meal. He had captured a bunch of Hun cabbage and the meal consisted of plain cabbage boiled in water, without seasoning or meat. However, the men enjoyed it as much as a real meal, because it was the first since the attack started. I happened to be the last to come up only to find that there was nothing left for me. I don't believe anything has ever left me so weak and hopeless as walking up to this meal, when I was famished, only to find it all gone. The reason for the lack of food was that nearly all our reserve rations were lost during the fighting of the 12th.

Vigneulles had been burned by the Huns prior to their evacuation and it was still smoldering. Everything was in ruins. There were quite a few dead Germans in Vigneulles, but most of them showed signs of having been killed by artillery.

14 September, 1918.

As the 1st Division had *turned-in,* closing the salient on the night of the 13th, and my battalion receiving no orders to attack with or stay in support of that Division, I found myself at Vigneulles at sunrise with nothing to do. It became necessary for me to decide on my own initiative what action to take—to withdraw, or attack with the nearest unit attacking outward from the salient. At this time Vigneulles itself was on our outpost line, but there were no signs of the enemy. As my motor equipment had not yet arrived, due to the road conditions in the rear, I took a solo motorcycle which we captured from the Germans on the 12th and rode up the Vigneulles—St. Maurice Road, which was the outpost line of the 26th Division, to reconnoiter the situation

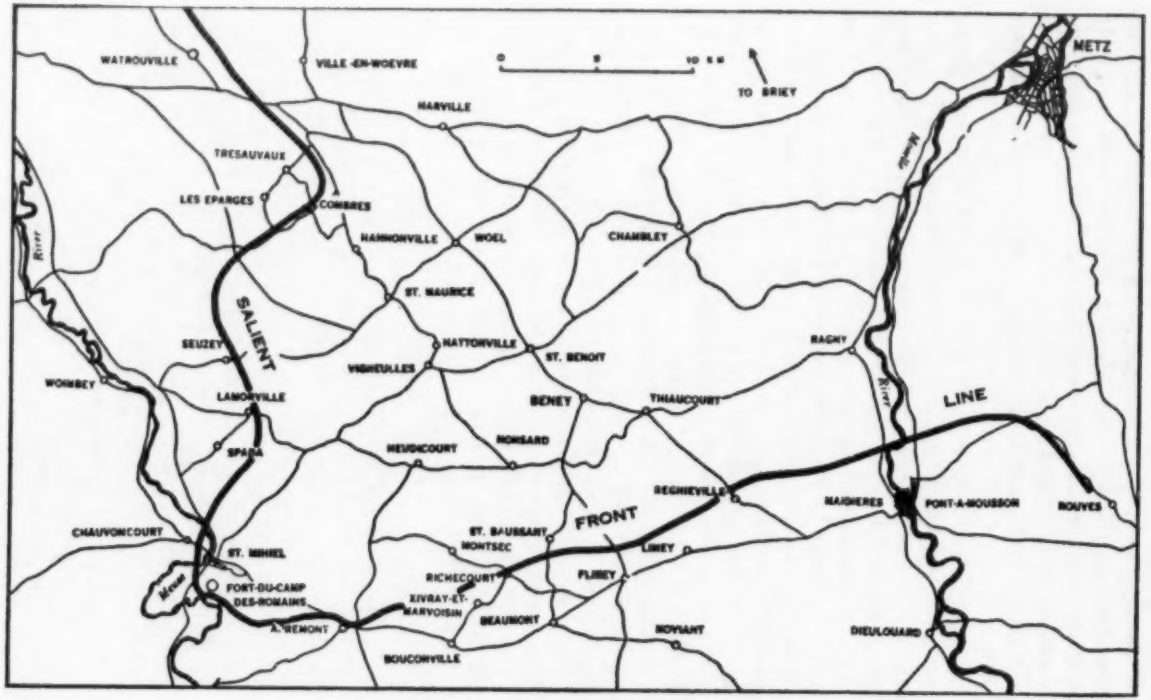

FIGURE 3.—The St. Mihiel Salient.

in person, to enable me to decide on the plan of action for the day. At Hattonville, I ran into an abandoned Hun food dump and made a hasty breakfast on Hungarian apple butter and some German hardtack.

On interviewing the outposts of the 26th Division, I found that they had completely lost contact with the enemy, so on reaching St. Maurice I passed through our lines and rode out in the direction of Woel. When very near the town, my motorcycle stalled. On inspecting it, I found I had just about sufficient gas to return to my battalion, so I decided to return, get the battalion, return over the same road and feel to the front in an endeavor to gain contact for our army at this point. Up to the time I turned back I saw no signs of the enemy, although I had penetrated their lines to a distance of about five kilometers. There was, however, quite a little machine-gun and rifle firing to my right and a little to the left.

On returning to my battalion, I got 38 tanks under way in the direction of St. Maurice by 7:30 AM. Colonel Patton, the tank brigade commander, came up in a car just as we were starting and accompanied the column on foot. Hattonville was set on fire by the Germans before they left, and huge heaps of coal at the railroad station were still burning and the ruins of the town were still smoking. A couple of German planes attacked my rear echelon on this march, but no one was hurt, except one man who was shot through the arm by one of our antiaircraft shrapnel balls. At St. Maurice I took the battalion through our outpost line into the enemy's territory, much to the surprise of the outpost there. On the run from St. Maurice to vicinity of Woel, we took two prisoners (Austrians) who happened to be wandering down the road, thinking it was perfectly safe. They did not put up any fight and seemed to be quite happy to be taken prisoners. They were sent to the temporary prisoner cage at St. Maurice. I finally halted and camouflaged the battalion in the vicinity of Woel at 11:30 AM.

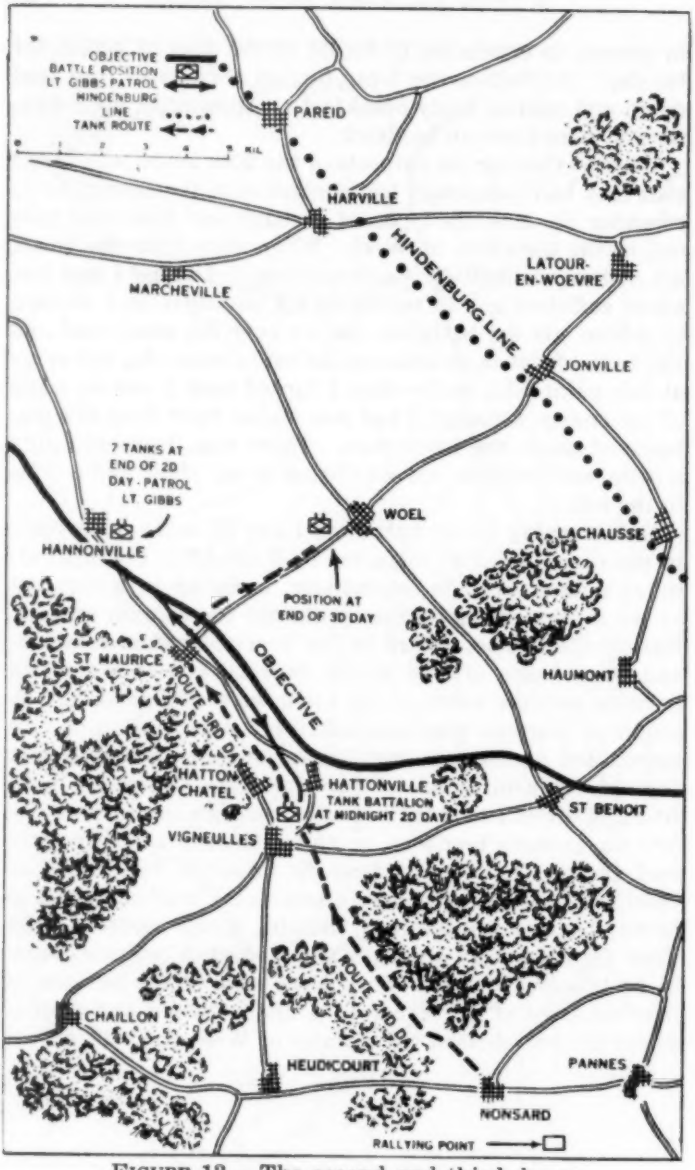

FIGURE 13.—The second and third days.

At this point we have something to ponder upon. By reviewing the diary and checking the map (Figure 13) we find that this tank battalion is well ahead of its own infantry and also the line set for the army objective. It it not preceding an assaulting move as a casual reader might think. For the time it has cut loose from the infantry and is on its own, well out to the front. This was no accident of battle but a deliberate move and was so understood by all. They even joked about it. As one officer said, "The brigade commander had joined us and, upon consulting his speeches to the Staff College, found we were acting without infantry and were therefore a 'cavalry patrol'." There is truth to that statement. Iron cavalry, a product of modern scholastic thought, was used at least this once in the World War.

Thus this is a unique situation. Here we have an independent armored force—it has not found the 1st Division yet—between two armies, one retreating and the other following up. True the pursuing Renault tanks are slow and not particularly reliable—the last few days have proven that—but now they are through the worst of the going and are on ideal terrain for tank action. Contact has been lost with the enemy and their own infantry is well to the rear.

No one had yet created a doctrine or written the tactics to cover such a situation. But here it is. What can the Major do? Well, let's turn to his diary and see.

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14 September (continued)

From Woel I sent out a patrol of three tanks and five riflemen, under 2d Lieutenant Edwin A. McCluer in the direction of St. Benoit in an endeavor to establish liaison with units on the right and to gain contact with the enemy. After fulfilling his mission in the direction of St. Benoit, Lieutenant McCluer retraced his steps part way and then penetrated as far as Jonville and there encountered an enemy battalion debouching from the town in close column. The enemy were demoralized and scattered by fire from the tanks and accompanying men, and retreated into

the town. After this action the patrol started to return to the battalion under heavy shell fire, but two tanks went out mechanically. Rather than abandon his two tanks, Lieutenant McCluer coupled them together and dragged them, at the same time sending in for help by Corporal Patton, who was wounded through the arm by a rifle bullet. On receiving word, five more tanks were sent out under 1st Lieutenant Gordon Grant to support Lieutenant McCluer. Lieutenant McCluer and two men were wounded during the above action. Both patrols returned with all tanks and men by 5:00 PM.

The Brigade commander's squib about the tanks being cavalry was no joke. Here they are doing forward reconnaissance and lateral contact missions—typical cavalry functions. If we judge an arm by its functions, then, for the moment, they were cavalry. However, too many people confuse cavalry with a quadruped called a horse. These tankers were something more than conventional horsed cavalry. They had the temerity to push the snout of their iron mounts against the organized Hindenburg line and the audacity to lash out and put to flight an infantry company. And it has been many a century since cavalry could do this last. What else the Major would have done if he had not been cautioned by a general officer to slow up his advance until he had close infantry support is interesting to speculate upon. Unquestionably the feeling-out of the retreating front would have been in force and today we would have more data on the mass action of tanks to use in developing our mechanized forces. At least this much can be said: the Major within his prescribed limits with great skill and audacity tested the clumsy Renaults to their capacity; and the tactics he had to improvise on the spur of the moment stood the test of battle.

As to the reconnaissance trip McCluer summed it up succinctly as follows:

"Experiences of the third day included taking a patrol of three tanks from Avillers through Woel to the outskirts

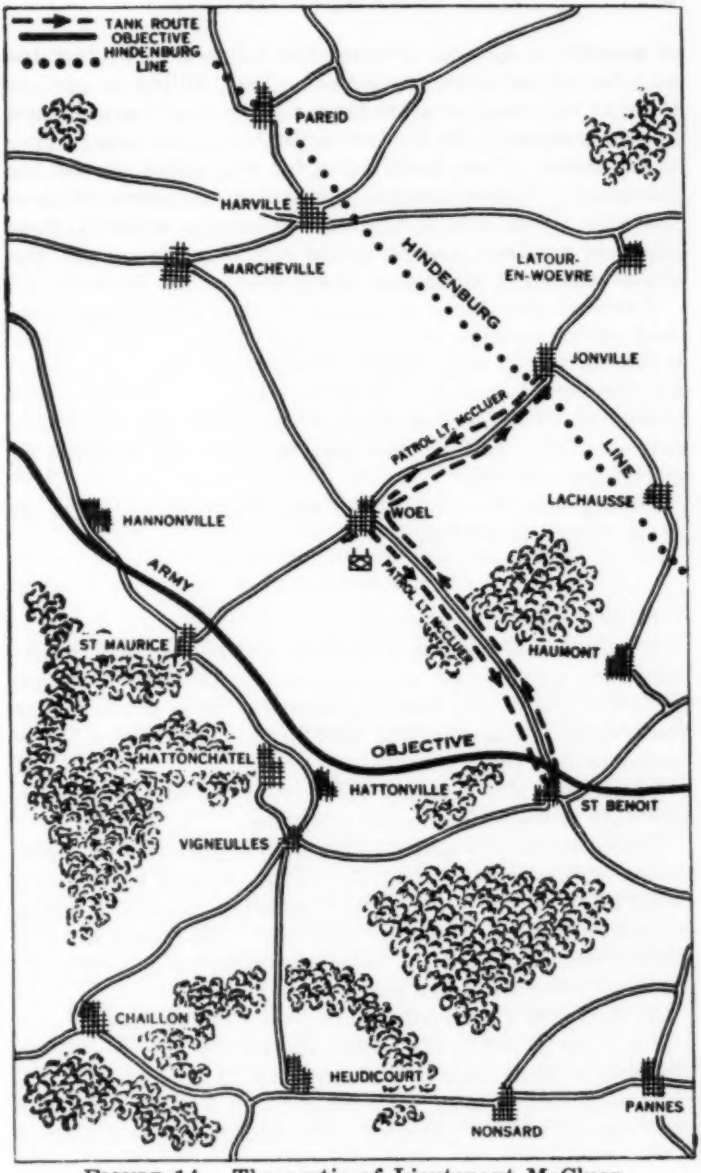

FIGURE 14.—The sortie of Lieutenant McCluer.

of Jonville, a distance of some five kilometers, leading the way for an infantry intelligence officer, killing or putting to flight the crews of more than a dozen machine guns and a seventy-seven." He is a laconic lad but we can add further to his story. From his citation for this action we get the following: "Commanding a reconnaissance patrol of three tanks he put to rout a company of German infantry, four pieces of artillery, and destroyed eight machine guns. His action was eight kilometers in advance of our front lines."

From all this there is enough to show that tanks were used for reconnaissance, for contact missions, and, that as a combat patrol they fought infantry, machine guns, and artillery with success. Moreover, they penetrated eight kilometers in advance of the line. Yet the tanks came back safely. There is food for thought there for students of mechanized tactics.

During this time what was the Major doing? Let us again return to his diary.

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14 September (Continued)

During the afternoon, I also sent out several foot reconnaissance patrols and went out once with Colonel Patton and twice alone. On receiving information as to location of the enemy, a message was sent to 1st Tank Brigade for transmittal to those concerned.

Lieutenant Morrison arrived during the afternoon with ten more tanks which he had unditched.

Heavy artillery, assisted by German airmen started registering on my tanks at about 6:00 PM. A little later, under cover of the dusk, I moved the battalion about one-half a kilometer south to avoid the shelling. The enemy did not realize we had moved for he concentrated on the old position just after we pulled out.

At 9:05 PM I received orders from Colonel Patton, who had left early in the afternoon, to proceed immediately to the Bois de Thiaucourt—a distance of 22 kilometers. The men were nearly dead with fatigue and loss of sleep, but they responded with splendid spirit and the entire battalion

was again on the march at 9:20 PM. Just as we were leaving, thousands of troops of all descriptions began to move forward into the position we had held all day.

The march back to the Bois de Thiaucourt was very spectacular, fatiguing and exciting. We came under shell fire at different points, but I did not lose a man. Arrived at the Bois de Thiaucourt at 5:00 AM September 15 and camouflaged the tanks in the woods. Several men on this trip simply dropped down—numb from fatigue and loss of sleep.

15 September, 1918.

The battalion remained bivouacked in the Bois de Thiaucourt (behind the lines) until 7:30 PM. The repair and salvage section of the battalion was busy all day collecting damaged tanks and dispatching them to the battalion. I let the men sleep and eat all day. Poor devils, they looked as if they had gone through seven hells. Personally, I drove my car over our attack sector, again went up to the Woel area, where a little fighting was in progress, and later visited headquarters of the 1st Division.

The 345th Battalion, and the 14th and 17th Groups (French) who operated under our brigade were also in the Bois de Thiaucourt.

During the afternoon I received confidential information that we would leave for another sector shortly, to pull off another fight.

I also received orders during the afternoon to command the entire Brigade column (176 tanks) during a night march from the Bois de Thiaucourt to the Bois de Hazelle (approximately 12 kilometers farther to the rear). The march started at 7:30 PM and proved to be a very gruelling hike both for machines and men, owing principally to the fact that most of the distance was off the roads in shell-torn country. We again came under severe hostile shell fire when passing through Essey as the Germans were trying for the bridge at that place with some of their 150's. No one hurt. Arrived in the Bois de Hazelle at 5:00 AM September 16th.

The captured country was very picturesque and the weather during the 15th was beautiful. The countryside was

strewn with the German materiel abandoned in the retreat. Most of the civilian population of all towns were removed into Germany and the towns burned. A few towns escaped this treatment. The town of Heudicourt was one of these which I drove through during the morning of September 15th. The people were very joyful and some people had returned from the interior of France. It almost brought tears to watch these people who had been restored to their homes and country. I stopped to put some water in my radiator and I—the only American in town at that time—was nearly mobbed by weeping old men and women and young girls.

16 September, 1918.

Remained in the Bois de Hazelle. Let my men rest as much as possible, but we had to complete the job of cleaning the tanks and unwinding barbed wire from the axles of the machines. The Brigade Repair and Salvage Company, the battalion repair and salvage units, and the company and platoon mechanics worked industriously to get the tanks in condition.

Received a copy of the President's message to General Pershing lauding the success of the 1st American Army in its operation against the St. Mihiel salient.

17 September, 1918.

Out all day looking up re-supply of the Battalion, entraining points, and transportation (rail). The men are beginning to look like men once more after their rest yesterday and last night. They certainly have shown splendid spirit through this fight.

Learned during the evening that the entire St. Mihiel salient is now cleaned out. Our captures comprise some 15,000 men, 200 guns, several hundred machine guns, thousands of small arms, and vast stores of war materiel. Our losses have been remarkably light—about 7,000 in the entire engagement. I understand that 80,000 casualties were expected in the reduction of the St. Mihiel salient, so this small casualty list comes as a very welcome surprise to everyone.

The designation of my battalion has been changed from

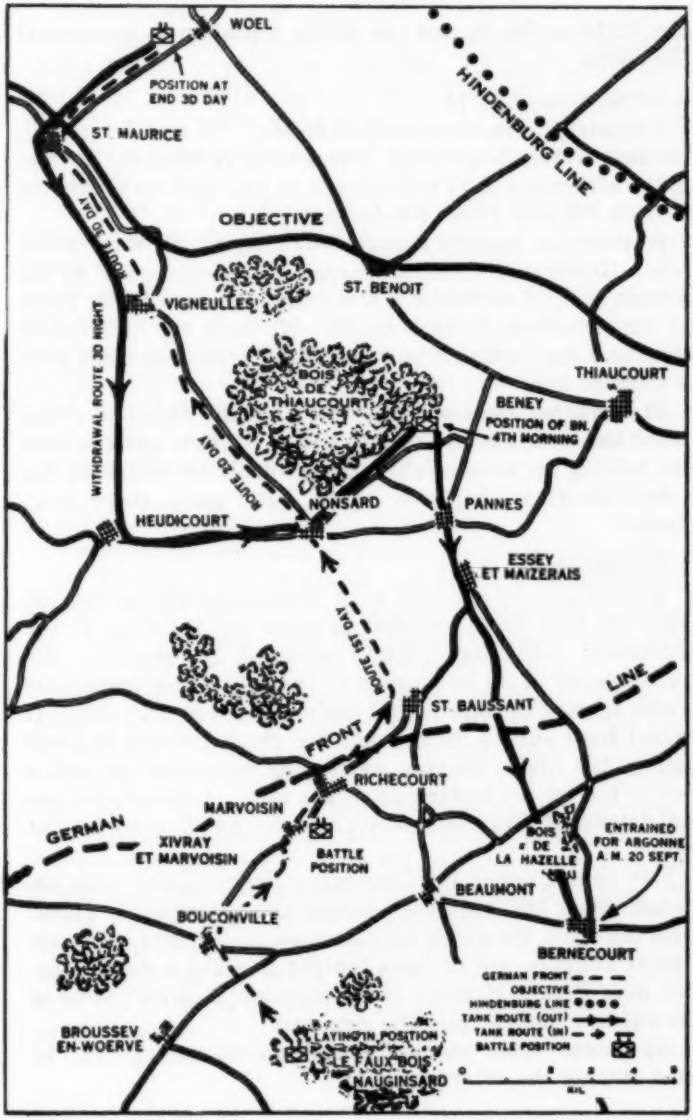

FIGURE 15.—Route of the tanks to the rear.

the 326th to 344th, and the 327th Battalion is now called the 345th.

18 September, 1918.

Preparing to move to another sector. We were to entrain for new sector tonight, but orders were revoked rather late in the afternoon and I will entrain in two sections tomorrow at 5:00 PM and 11:00 PM instead.

Appears as though Austria were trying to start peace talk. However, it looks as though the Germans are at the bottom of it. Conditions in Germany are painted very black by the prisoners we have taken. We have one hundred of them and they couldn't be driven back across the lines with a machine gun.

The weather has been very bad since the 16th and living conditions terrible due to the lack of shelter, but the men are holding up wonderfully. They should be sent back for a rest before we hop over again, but I guess there is no chance.

19 September, 1918.

Worked around our tank park all morning and up to 4:00 PM. At that time I started to move my battalion to the entraining point immediately south of Bernecourt. We were delayed in our entraining by the French not having our trains spotted in time. First train arrived at 8:20 PM. It rained hard during the day and the clouds seemed to burst during the night, making entraining very difficult and a severe tax on the endurance of the men. Learned that we will detrain at Clermont-en-Argonne for an offensive in that sector.

Five tanks, under 1st Lieutenant Harry Gibbs, were detached from the battalion during the afternoon. These, with ten from the 345th Battalion, all under 1st Lieutenant Ernest Higgins, are to leave tonight to make a demonstration near Pont-a-Mousson in an endeavor to divert some of the enemy's forces from the Argonne.

My motor train started for Clermont-en-Argonne, by road, during the afternoon.

20 September, 1918.

The first train section of my battalion left entraining point for the Argonne at 1:00 AM. Second section left at 9:00 AM. I left Bernecourt, with my staff, by automobile, for Clermont at 10:45 AM. The roads leading to the Argonne are simply packed with troops, guns, and vehicles of all kinds.

Stopped at Toul for a hot bath and a change of underwear. Great God! What a sensation to get clean once more!

Stopped with the 364th Aero Squadron for the night at Courcelles—a ghostly, little, destroyed town with a few skeletons of walls still standing. The truck train and both sections of the battalion arrived at Clermont during the night and were camouflaged in a small patch of woods about 500 meters north of Clermont at a spot picked out by the Brigade Reconnaissance Officer.

So the story ends and we take leave of the gallant battalion. We know it will get no rest for it is headed for the bloody Meuse-Argonne battle, one of the greatest assaults the world ever saw. We feel like saying good luck, knowing full well that many will never come back.

Lynx-eyed General Headquarters had something to say about the tanks in the battle of St. Mihiel. It goes about as follows: "Where the tanks took advantage of every opportunity to gain ground and did not hesitate to operate in advance of the infantry, their services in cutting wire, in overcoming machine guns, both in timber and in the open, were highly effective." With this we feel that the General Staff must have had a particular eye on our battalion. But when it adds: "Where the advance was cautious, and when they remained habitually behind the infantry, they accomplished nothing. If tanks are to be anything but a nuisance they must always be used in future with boldness and aggressiveness."

If it were not *lese majeste*, or something of the like, we would say loudly, "Right you are, but brother you don't mean this battalion. Take a look at the record."

Here it is.

CHAPTER 2

Motor Reconnaissance Patrols

(INFANTRY SCHOOL TEACHING)

Present teachings of both the Command and General Staff School and The Infantry School envisage the use of motors as a reconnaissance agency. Motor reconnaissance detachments from a regiment, brigade, or higher unit may be a sizable force of riflemen, machine guns, antitank guns, artillery, chemical troops, headquarters and signal troops, engineers, and medical personnel. The size of the command and the tactical situation facing it will dictate the size and composition of the detachment. Normally the detachment, which is improvised from the troops of the command, marches between the main body and the advance guard. However, to accomplish its mission it may often have to precede the advance guard.

While such a detachment is called a *reconnaissance detachment*, one should not draw the erroneous conclusion that reconnaissance is its sole function. Reconnaissance is its primary mission, to be sure, but in essence it is a mobile combat element that may be used on a variety of missions. It can clear the way for the main body, or seize and hold positions until the arrival of the main body. It can be used for a reconnaissance in force, or in delaying action, or for either rear or flank guard. Attached to the advance guard, it can be used as a pivot of maneuver, or as a maneuvering force. In fact this new motorized force has so many possibilities that it is a bit bewildering to contemplate. Just how many of these things should be done—and just when, how, and where—will furnish

another set of perplexities. This is naturally so, for what is going on before our eyes is a radical change in the technique of war. We are developing motor soldiers, and what the end may be cannot be foretold. The experiment with the new type division, now being held, will not settle all questions; rather it will produce others. We are going through a process of evolution so rapid it almost seems revolutionary.

But whatever may happen to our motorized troops and what methods must be devised for handling them, this much seems plain—whatever evolves will necessitate the development of a technique of motor patrolling. For the moment, then, we can lay aside all other problems and investigate this one.

As it now stands, infantry, through the use of its motors, has the power to extend the range and speed of its reconnaissance far beyond what is possible with dismounted men. The advantages of such a step-up in the possibilities of infantry patrolling can only be realized if a proper technique is developed for the control and use of motor patrols. In this chapter we shall endeavor to outline such a technique.

Reconnaissance is the search for information in the field. This information may be obtained by observation alone, or it may require combat. Here is the first fact bearing on the technique of motor patrolling. Officers sending out motor patrols should early decide whether the mission of their patrols calls for reconnaissance alone or reconnaissance and combat. These factors will determine largely the strength and composition of the patrols. A patrol with a purely observation mission requires only sufficient personnel to operate its transportation and to furnish the required number of observers, replacements, and messengers. A patrol which must fight to gain its information should have sufficient combat power to accomplish its mission. This will include suitable antitank weapons. Of course, the patrol leader and all the men of the patrol should know whether the patrol is to seek com-

bat, or to fight only when necessary to accomplish its mission.

The minimum number of vehicles which may be assigned a patrol is the smallest number necessary to transport the personnel of the patrol. But truck capacity is not a good gauge as to the number of trucks required, particularly for small patrols which are not required to fight. Usually additional vehicles are desirable, for motor patrolling is not a troop movement but a tactical maneuver.

When available vehicles permit, motor patrols should consist of not less than three vehicles, one of which may be a messenger vehicle. Thus a small observation patrol of four or five men, while capable of being transported in one truck or passenger car will have a much better prospect of accomplishing its mission if provided with two vehicles in addition to the necessary number of messenger vehicles.

The conduct of small motor patrols is based on the following:

1. Wheeled motor transport is essentially one-dimensional. *It must follow roads.*

2. Because it is so road-bound, the motor patrol is easily ambushed and captured or destroyed.

3. It can develop little or no combat power while in motion. The patrol must stop and dismount to fight.

From the above it can be easily seen that primary security of the patrol while in motion is obtained by an extension in depth along the road on which it moves. Consequently, at least two vehicles should be furnished any patrol which is to go beyond the immediate vicinity of protecting troops in order to give it the advantage of depth.

ORDERS TO PATROLS

The order to the motor reconnaissance patrol should include:

1. Designation of the leader.
2. Composition of the patrol (personnel and vehicles).
3. Enemy situation.

4. Own situation and plans (only as they affect the patrol).

5. Route of the patrol.

6. Mission. This should be stated in the form of questions, the answers to which are to be brought in.

7. Time when information must be received by the officer desiring it.

8. Time when the patrol is to start.

9. Phase lines, control points, or message relay points when such are necessary to insure control and communication.

10. Whether the patrol is to seek combat or fight only to accomplish its mission.

11. When and where the patrol is to return.

12. Positive or negative information or periodic reports —when they are to be sent.

13. Where messages may reach the officer dispatching the patrol throughout the conduct of the reconnaissance.

ORDER OF PATROL LEADER

The order of the patrol leader should include:

1. Designation of second in command.

2. Assignment of personnel to vehicles.

3. Explanation of enemy and friendly situation to all members of the patrol including information of adjacent patrols.

4. Mission of patrol: route, questions to be answered, where messages are to be sent, periodic reports, when and where to return.

5. Whether patrol is to seek combat or fight only to accomplish the mission.

6. Initial formation of patrol.

7. Designation of first bound.

8. Assembly points in case of dispersion.

METHOD OF PATROLLING

The patrol advances along the road by bounds, each vehicle making the bound separately. The leading vehicle of the patrol on arriving at the end of a bound, which should be a place with cover, does not advance from this cover until a careful reconnaissance of the next bound is made by observation, preferably by field glasses. The second vehicle joins the leading one in this covered position. When all appears clear the leading vehicle makes the next bound at maximum speed. The second vehicle meanwhile covers the advance of the leading vehicle, prepared to support its movement by fire. Frequently the terrain will not permit of such continuous support of the leading vehicle by the vehicle in rear. In such cases the second truck should regain its supporting position as soon as possible. Where the terrain is particularly difficult for maintaining continuous mutual observation between vehicles, the leading vehicle may be given several additional men who may be dropped off individually at turns in the road or similar places where mutual vision is blocked. Such a man acts similar to a connecting file with an advance guard, thus maintaining communication between the vehicles of the patrol until picked up by the next truck in rear. After this process has been repeated several times, the connecting files may be tranferred to the leading vehicle during the halt at the end of a bound.

The preliminary reconnaissance of a bound should be as brief as possible in order to avoid waste of time. It is best made by the vehicle commander from behind a hill or ridge crest. Where combat is not sought and contact with the enemy is expected, vehicles may be turned around prepared for a quick getaway while the reconnaissance of the next bound is being made. Frequent dismounted reconnaissances may be necessary, particularly when information is desired of villages, bivouacs and other occupied areas. In such cases the vehicles of the dismounted party should be concealed and the remaining vehicles should be held back ready to cover the dismounted party or to make a getaway.

A commander should be designated for each vehicle. In a

patrol of two trucks and a messenger vehicle (motorcycle) the leader of the patrol should ride in the rear truck. In each truck men should be detailed to watch to the right, the left, and to observe for signals from the other vehicles.

The best defense against ambush is distribution of the vehicles in depth. With patrols of two or three vehicles, there is naturally a limit to the extension which is possible without losing control. The patrol and vehicle commanders should understand that ambushes are most apt to be encountered in defiles, particularly woods which, as a rule, offer the longest defiles. The most effective ambushes are those which block the head of the patrol with a road block defended by fire and then establish a similar block in rear of the last vehicle. Dismounted reconnaissance of probable ambush locations is a wise precaution.

ORGANIZATION WITHIN THE VEHICLES

A suitable patrol with two trucks and a motorcycle with sidecar might be organized as follows:

Leading truck—driver

One man seated by the driver to observe to the front.

(Should be second in command of the truck)

One man seated in truck body observing to right.

One man seated in truck body observing to left.

One man in truck body to observe and signal to rear truck.

Truck commander (second in command of the squad) standing in truck body just behind cab. The top must not be on the truck.

Second truck—driver

Second in command of truck seated with driver, observing leading truck.

Patrol commander (who is also vehicle commander) standing in truck body.

Observer seated in truck body watching to the right.

Observer seated in truck body watching to the left.

(If a light machine gun is carried it should be in this truck.)

The motorcycle should follow the second truck by short bounds.

It will be noted that a patrol consisting of one rifle squad, and one-half a light machine-gun squad makes a suitable detail for a two-truck patrol.

In patrols which are required to fight, the leading truck should be manned as given above. The second and succeeding trucks may carry capacity loads.

MOTORIZED DETACHMENTS

When a zone is to be reconnoitered whose width exceeds that which can be handled by a single patrol it is usually best to create a motorized detachment sufficiently strong to provide the necessary number of patrols to cover the zone. The reconnaissance mission is then given to the detachment commander. He in turn creates the necessary number of patrols, assigns them their routes, zones, and missions, and then follows with the balance of the detachment over a more or less central route behind the patrols. The detachment is thus able to back up its patrols with some fighting strength and to furnish new patrols as needed. It acts as a reservoir for patrols and a clearing house for the information they furnish.

The actions of a motorized detachment must be carefully controlled and coordinated by the detachment commander. He must know where his patrols can be reached and they in turn must know where to reach him. Radio should be used as much as its efficiency will permit but the organization of each patrol must be such that messages may still be dispatched if the radio breaks down. For this purpose the motorcycle—solo or with sidecar—is very useful. If other more suitable transportation is not available extra trucks must be used.

The standard signals are usually all that are required. These include the following:

1. Forward march.
2. Column right (left).
3. Halt.

4. Increase (decrease) the gait.
5. Fight on foot.
6. Enemy in sight.

When a unit is to be employed as a motorized reconnaissance detachment it is apparent that extra trucks must be furnished in addition to the minimum necessary for normal transportation requirements. Such a detachment does not load its reconnaissance vehicles to capacity.

Truly, motor reconnaissance is a new subject for infantry and one that is developing at a rapid rate. While the foregoing pages indicate that a fair start has been made, one should not leap to the conclusion that the problem has been solved. Far from it. There is much more to do. Officers of zeal and enthusiasm will find scope for their ingenuity in utilizing this new reconnaissance agency in accordance with its characteristics. The whole endeavor is to fit it into the scheme of modern battle.

As a start in applying principles of motor patrolling—or in developing one's own methods of utilizing this new agency—the student cannot do better than solving the map problem in the following chapter.

CHAPTER 3

Motor Patrolling

(INFANTRY SCHOOL TEACHING)

ILLUSTRATIVE PROBLEM

SECTION I

1. *SITUATION.—a.* Maps: General Map. Gettysburg, 1925. 1 inch = 5 miles. U. S. G. S., 1:62,500. Martinsburg Quadrangle. (See pocket in back of the book.)

b. The Blue First Army is defending Virginia from a Red invasion by holding the south bank of the Potomac River with its left flank near Harper's Ferry. Red (Pennsylvania, Maryland, and West Virginia) has been unable to cross the river on the front of the First Army.

c. Information recently received by Blue indicates Red may attempt a crossing from West Virginia to strike the left flank of the Blue First Army.

d. At midnight 31 March, the 1st Brigade which had been in Army reserve near Hillsboro (300-670) was reinforced with artillery and service units and directed to protect the left of the First Army by preventing a hostile crossing of the Shenandoah from West Virginia.

e. Brigadier General 1st Brigide decided to march on the Shenandoah River in the direction of Charles Town (290-680) at 9:00 AM 1 April preceding the brigade with a motorized detachment. Part of his plan for the reconnaissance follows.

(1) To constitute the detachment as follows:

Company A 1st Infantry

1 platoon Company D 1st Infantry
1 section Regimental Machine-Gun Company 1st Infantry (caliber 0.50)
22 1½-ton trucks
7 motorcycles with sidecars
4 passenger cars (5-passenger)
2 cross-country cars equipped with voice radio.

(2) To have the detachment leave bivouac at daylight 1 April and march as a unit to Mechanicstown (290-680) via the bridge (assumed) at Bloomery (290-675), then to reconnoiter the area Martinsburg (280-705)—Sheperdstown (295-700)—Halltown (295-685)—Middleway (275-685) to determine any Red activity in that area which might affect the mission of the brigade.

2. *FIRST REQUIREMENT.*—The order to the commanding officer Company A (the motorized detachment commander) issued by Brigadier General 1st Brigade, omitting matter that would ordinarily be contained in paragraph 1.

SECTION II

3. *A SOLUTION OF FIRST REQUIREMENT.*—The brigade commander's order to Captain Company A:

At daylight tomorrow your detachment will march initially on Mechanicstown. From there you will reconnoiter the area Martinsburg—Sheperdstown—Halltown—Middleway.

Answers to the following questions will be furnished by noon 1 April.

a. Are there any Red troops in the above area?

b. If so, what is their strength, composition, position, and activity?

Positive or negative information will arrive at brigade command post as follows: 9:00 AM and 10:30 AM.

Identifications are desired.

The detachment will act aggressively.

The detachment will return to the brigade bivouac by 4:00 PM 1 April.

Messages will be sent to you at Mechanicstown or en route thereto until 8:00 AM. You will report prior to that hour your subsequent positions.

Messages will reach brigade command post as follows:

Until 9:00 AM at present location (Hillsboro).

Thereafter * * *

4. *SITUATION, CONTINUED.*—The detachment, preceded by an advance guard, arrived at Mechanicstown without incident at 6:45 AM. The detachment was halted with a march outpost and Captain Company A prepared to issue his orders for the conduct of the reconnaissance.

5. *SECOND REQUIREMENT.*—The orders as actually issued by Captain Company A for the conduct of his reconnaissance, assuming that all officers and patrol leaders are familiar with the situation and are present.

SECTION III

6. *A SOLUTION OF SECOND REQUIREMENT.*—Orders of Captain Company A for the conduct of reconnaissance:

You know the situation.

Here is a marked map. Make notes.

This detachment will reconnoiter the area Martinsburg—Sheperdstown—Halltown—Middleway.

Patrol No. 1:
Section Leader 1st Platoon Company A.
1 platoon messenger
1 rifle squad and ½ light machine-gun squad 1st Platoon
2 trucks
1 motorcycle with sidecar
1 passenger car.

Route: Millville (295-680)—CR 407 (295-685)—RJ 382 (300-690)—Moler Crossroads—RJ 424 (295-695). Thence via river road to Sheperdstown.

Special instructions: Are there indications of Red preparations for a river crossing along the Potomac River?

Patrol No. 2:
Lieutenant 1st Platoon
1 platoon messenger
1 rifle squad and ½ light machine-gun squad 1st Platoon
2 trucks
1 motorcycle with sidecar
1 passenger car

Route: RJ 409 (290-680)—Harpers Ferry Road—Halltown—Reedson (295-690)—RJ 483 (295-695)—Sheperdstown.

Patrol No. 3:
Platoon Sergeant 1st Platoon
1 platoon messenger
1 rifle squad and ½ light machine-gun squad 1st Platoon
2 trucks
1 motorcycle.

Route: RJ 470 (290-680)—RJ 517 (290-680)—Shenan-

doah Junction (290-690)—RJ 508 (290-695)—RJ 467 (290-700)—Smithfield Road—RJ 515 (290-695)—Wynkoop Spring (290-700).

Patrol No. 4:
Section Leader 1st Platoon
1 rifle squad and ½ light machine-gun squad 1st Platoon.
2 trucks
1 motorcycle.
Route: Charlestown—RJ 530 (285-680)—Bardane (285-690)—Smithfield Road—Mt Airy School (285-700)—CR 467 (285-700).
Special instructions: March will be under Lieutenant 2d Platoon through Charles Town.

Patrol No. 5:
Section Leader 2d Platoon
1 rifle squad and 1 light machine-gun squad 2d Platoon
1 messenger 2d Platoon
2 trucks
1 passenger car
1 motorcycle with sidecar.
Route: Charles Town—RJ 580 (280-685)—RJ 555 (285-685)—Leetown (280-690)—RJ 490 (285-695)—Blairtown (280-700).
Special instructions: March will be under Lieutenant 2d Platoon to RJ 580.

Patrol No. 6:
Lieutenant 2d Platoon
1 rifle squad and 1 light machine-gun squad 2d Platoon
1 messenger
2 trucks
1 cross country car, radio equipped
1 motorcycle with sidecar.
Route: Middleway—New Haven School (275-695)—Martinsburg.
Special instructions: Patrols 4 and 5 are attached to this patrol through Charles Town.

Answers to following questions will be furnished by 10:30 AM, by all patrols:

a. Are there any Reds in the area covered by patrols?

b. If so, what is their strength, position, composition? What are they doing?

Identifications are desired.

Patrols will act aggressively to accomplish their mission.

Phase lines will be reached as follows:

B & O Railroad—Bardane—Leetown—Middleway by 8:00 AM. Final objective by 9:30 AM. Reports will be sent of arrival on phase lines to reach the detachment command post by 8:30 and 10:15 respectively.

Patrols will rejoin the detachment at Kearneysville (285-695) by 10:30 AM. Patrols unable to reach Kearneysville will return direct to the brigade.

The detachment, less patrols, will march at 7:30 AM and remain at control points as follows:

RJ 530 from 7:45 to 8:15 AM.

Kearneysville (via Bardane) after 8:40 AM.

Advance guard:

Platoon Sergeant 2d Platoon

One section 2d Platoon

One squad, caliber 0.50 machine guns.

The main body in order: Company A (less detachment), platoon Company D, will follow the advance guard at 1,000 yards. Section (less one squad) caliber 0.50 machine guns will be prepared to provide antitank protection of the main body.

CHAPTER 4

Preparation and Purpose of Efficiency Reports

(AN INFANTRY SCHOOL STUDY)

Efficiency reports are of the utmost importance to officers in the army today. The use that is being made of these reports in selecting officers for schools and other details renders it imperative, in justice to the government and the officers concerned, that the utmost care be taken in preparing and rendering reports.

The following study represents the best thought on this subject at The Infantry School. The study was made in the hope that this difficult task would be made simpler for the rating officers and more equitable to the rated officer. The methods of attacking the problem have been tested with good results at The Infantry School. The interpretation of various vexing points has been made only after long investigation and study. It is believed that the conclusions arrived at and the methods outlined herein are basically sound.

However, the reader should not confuse this study with an authoritative War Department publication on this subject. Unlike such a publication—which is a basic order—this study is purely advisory and suggestive in nature and should be regarded as such. At the same time, unless an officer is prepared to make an extended study of the basic regulations on efficiency reports and make his own interpretation of certain knotty points, he should find this study of great help and guidance. To officers being rated the study will prove of value through indi-

cating the method by which they are rated, the foundation of the rating, and what eventually happens to it. The basis for this study is contained in letters of the War Department, A.G.O., 201.61, Misc. M.C., dated January 29, 1936, February 14, 1936, and October 28, 1937, on the subject of Efficiency Reports; in AR 600-185, dated June 26, 1935; in Circular No. 1, War Department, January 2, 1936, and Section III, Circular No. 74 War Department, November 11, 1937; and Section IX, National Guard Regulations 20. The study considers only War Department Form A.G.O No. 67, dated July 1, 1936, and War Department, National Guard Bureau Form No. 67, July 1, 1936.

PURPOSE OF EFFICIENCY REPORTS

Efficiency reports serve two very important purposes. They are the foundation of an officer's classification with respect to his efficiency in his own arm or service; and they are the basis for determining his qualifications for special duties. In paragraph 3, AR 600-185 we are told that:

"Efficiency reports are designed—

(1) To report the duties performed during a definite period, together with the manner of their performance.

(2) To furnish accurate information as to the degree an individual possesses certain specified qualifications considered essential in the military profession.

(3) To make of record such special qualifications of use in the military service as an individual may possess, and the extent to which qualified."

The object of the efficiency report then is, above everything else, to give the War Department a picture of the officer reported on as seen through the eyes of the reporting officer. If proper care is exercised in the preparation of this report, experience has shown that a study of an officer's complete record, after he has had a reasonable number of years' service in the army, will give an adequate idea as to his character, attainments, and value to the service.

The efficiency report must not be used as a disciplinary measure for offenses for which the officer has not been tried or otherwise punished. The report must be considered as showing the manner of the officer's performance of duty and his official life. It is affected by punishment given for an offense, but should not take the place of disciplinary measures.

PREPARATION

It is due to the fact that efficiency reports are so important and of such vital and compelling consequence to an officer that all who prepare them are directed by Army Regulations to exercise the greatest care in their preparation. Most officers appreciate the importance of their duty in preparing efficiency reports and take this responsibility seriously. Some, however, through failure to realize the vital consequences with respect to the officer reported upon, submit efficiency reports in a perfunctory manner. This is wrong. It results in an officer who has worked hard for a year obtaining as his only reward an efficiency report which does not give him either due credit or justice. Other rating officers, although conscientious and painstaking, overlook certain considerations thus causing the report to be difficult to abstract and analyze by those who are making an effort to obtain a uniform system of classification. To obviate some of these factors, the following comments are made on the several paragraphs of the Efficiency Report, War Department, A.G.O.. Form No. 67, July 1, 1936.

(USE TYPEWRITER IF POSSIBLE. IF NOT, PRINT PROPER NAMES)

EFFICIENCY REPORT

(SEE AR 600-140)

A. OFFICER REPORTED UPON ..... (Name typed) ..... (Serial No.) ..... (Grade) ..... (Organization)

A's official status with respect to you .....

B. PERIOD COVERED BY THIS REPORT ..... months, from ..... to .....

C. STATIONS AT WHICH HE SERVED .....

D. CONSIDER CAREFULLY THESE DEFINITIONS, KEEP THEM IN MIND WHEN RATING, TAKING INTO CONSIDERATION HIS LENGTH OF SERVICE AND THE OPPORTUNITIES AFFORDED HIM, WHICH MIGHT HAVE A BEARING UPON HIS PERFORMANCE OF DUTY, PERSONAL CHARACTERISTICS, OR PROFESSIONAL QUALIFICATIONS.

UNSATISFACTORY: Performance of the particular duty reported upon or personal characteristics or professional qualifications below minimum standard—inefficient.

SATISFACTORY: Performance of the particular duty reported upon or personal characteristics or professional qualifications up to minimum standard—passably efficient.

VERY SATISFACTORY: Performance of the particular duty reported upon in an efficient manner. Personal characteristics, professional qualifications, or efficiency above that acceptable as SATISFACTORY.

EXCELLENT: Performance of the particular duty reported upon in a very efficient manner. Personal characteristics, professional qualifications, or efficiency above VERY SATISFACTORY but below SUPERIOR.

SUPERIOR: Outstanding and exceptional performance of the particular duty reported upon. Personal characteristics, professional qualifications, or efficiency above that considered EXCELLENT.

UNKNOWN: To be used in all cases in which the reporting officer has had insufficient opportunity during the period covered by this report to observe the officer reported upon to permit a rating as to the performance of the particular duty, his personal characteristics, or professional qualifications.

E. DUTIES HE PERFORMED: (State separately. Where possible show duration of each in months. Example: Co. Coundr. ordinary garrison training, 8 mos. Summary court, 6 mos. Brig. Adj. prepared training schedules, Supply Officer.) In describing the manner of performance of duty, use one of six classifications as given under D, and consider carefully the obstacles encountered by the individual in the performance of each duty listed. THE OPINIONS EXPRESSED UNDER "MANNER OF PERFORMANCE" ARE BASED ON—

INTIMATE DAILY CONTACT,
FREQUENT OR INFREQUENT OBSERVATION OF THE RESULTS OF HIS WORK,
ACADEMIC RATINGS.

(Line out inappropriate words or amplify under par. F according to circumstances)

Duty	Months	Manner of performance

F. What degree of success has he attained under the following headings: ENTRIES BASED ON PERSONAL OBSERVATION OR OFFICIAL REPORTS DURING PERIOD COVERED BY THIS REPORT. (See par. D above.)	Unsatisfactory	Satisfactory	Very satisfactory	Excellent	Superior	Unknown	G. Enter on lines below any outstanding specialties of value in the military service. MAKE NO ENTRIES EXCEPT WHERE STATEMENT IS BASED ON PERSONAL OBSERVATION OR OFFICIAL REPORTS DURING PERIOD COVERED BY THIS REPORT. Show pilot and/or observer ratings of Air Corps officers here.
1. Handling officers and men							
2. Performance of field duties							
3. Administrative and executive duties							
4. As an instructor							
5. Training troops							
6. Tactical handling of troops (units appropriate to officer's grade)							

H. To what degree has he exhibited the following qualifications? Consider him in comparison with others of his grade and indicate your estimate by marking X in the appropriate rectangle. (See par. D above.)	Unsatisfactory	Satisfactory	Very satisfactory	Excellent	Superior	Unknown
1. Physical activity (agility; ability to work rapidly)						
2. Physical endurance (capacity for prolonged exertion)						
3. Military bearing and neatness (dignity of demeanor; neat and smart appearance)						
4. Attention to duty (the trait of working thoroughly and conscientiously)						
5. Cooperation (acting jointly and effectively with another or others, military or civilian, to attain a designated objective)						
6. Initiative (the trait of beginning needed work or taking appropriate action on his own responsibility in absence of orders)						
7. Intelligence (the ability to understand readily new ideas or instructions)						
8. Force (the hardly of carrying out with energy and resolution that which on examination is believed reasonable, right, or duty)						
9. Judgment and common sense (the ability to think clearly and arrive at logical conclusions)						
10. Leadership (capacity to direct, control, and influence others in definite lines of action or movement and still maintain high morale)						

W. D., A. G. O. Form No. 67—July 1, 1936.

PLATE I—Face of the Efficiency Report Form.
(See pages 86 and 87 for Reverse side of form.)

PARAGRAPH A

The officer reported upon should have his name typed as it is borne in the Army Register (for Regular Officers). The serial number, grade, and organization of each officer must be included here. By organization is meant the regiment or other unit to which the officer is assigned or attached. A's official status with respect to the rating officer would include such a remark as "lieutenant in my company" or "plans and training officer of my battalion" or some such term that describes in general the relationship between the rating officer and the officer on whom the report is rendered.

PARAGRAPH B

The period covered by the report should be given in full, for example: 3-3/30 months, from January 1, 1938, to April 3, 1938; or, 1-17/30 months, from February 15 to March 31. In the latter example although neither month has 30 days, the denominator of the fraction is shown as of a 30-day month. In this case the time was figured: February 15 to March 14, inclusive—1 month; March 15 to March 31, both days inclusive—17 days.

PARAGRAPH C

"Stations at which served" applies only to those stations at which the officer served during the period covered by the report.

PARAGRAPH D

The definitions printed under paragraph *D* must be carefully studied. In this connection, it is well to know that officers of the Regular Army recently were grouped as follows:

Superior	13.4 per cent
Excellent	67.5 per cent
Satisfactory	18.9 per cent.

This grouping is considered to be approximately what it should be. In any event, it is what the army is doing and it is doubtful whether any influence should be brought to bear which would tend to change it, even if such a result were desirable.

The rating of *unsatisfactory* given on Form No. 67 indicates an especially poor performance of duty and especially lacking in the qualifications considered; in other words, below minimum standards—inefficient. *Satisfactory* under the old form was defined as "efficient, duty well performed; up to standard, qualification satisfactory", but under the new form it means up to the *minimum standard*—passably efficient—doing enough to just "get by". The rating of *very satisfactory* means efficient performance—that the performance of duty was better than just the minimum standard but not such as to warrant the next higher rating of *excellent*. *Very satisfactory* includes personal characteristics, professional qualifications, or efficiency which are above those accepted as *satisfactory*. The rating of *excellent* should be given only when the performance of the particular duty reported upon has been done in a very efficient manner, and when the personal characteristics, professional qualifications, or efficiency are above *very satisfactory* but below *superior*. The rating of *superior* signifies qualified to a preeminent degree; a preeminently efficient performance of duty, attracting attention because of its outstanding efficiency—just as the performance of duty rated *unsatisfactory* attracts attention because of its outstanding lack of efficiency.

The *unknown* column is considered to be of great importance. It happens, in quite a few cases, that an officer at an isolated station receives what is apparently a perfunctory rating of *satisfactory* when the reporting officer admittedly had no opportunity to observe ade-

quately the results of his work. Many officers apparently believe that to admit a lack of familiarity with the accomplishments of a subordinate is an evidence of inefficiency on their part. This may or may not be the case, but, in any event, the War Department wants the opinion of the reporting officer based on knowledge, and if that knowledge does not exist or cannot be acquired, an honest statement to that effect should be made. Paragraph *P, Remarks,* is a suitable paragraph in which to make this statement whenever the rating officer places *X* in the *unknown* column in paragraphs *F* or *H* of the report.

In comparing the old Form No. 67, dated December 1, 1927, with the new Form No. 67, dated July 1, 1936, it will be found that the ratings of *unsatisfactory, satisfactory, excellent,* and *superior* are common to both forms. The rating of *inferior* found on the old form is eliminated from the new form, and the ratings of *very satisfactory* and *unknown* are added. It is apparently the intent of the War Department that any performance of duty, or professional qualifications, or personal characteristics which are below the minimum standard should be rated *unsatisfactory.* In other words, the rating of *unsatisfactory* on the new form includes the ratings of *inferior* and *unsatisfactory* on the old form. Since *satisfactory* is the minimum allowable standard, the War Department considered it advisable to place on the new form an additional gradation between this minimum standard and *excellent.* Therefore, *very satisfactory* will, in all probability, include some officers heretofore rated as *satisfactory* and others once rated *excellent.*

In arriving at their ratings, reporting officers are directed by instructions to keep constantly in mind the definitions of the ratings as given on the report form; the above descriptions are furnished to amplify these definitions, so that further uniformity of application may result.

THE RATING OF SENIOR AND JUNIOR OFFICERS

The comparison of ratings for 1936 showed that of the colonels 34.8 per cent were rated *superior,* 59.1 per cent *excellent,* and 6.1 per cent *satisfactory;* whereas, 1st lieutenants were 9.5 per cent *superior,* 69.8 per cent *excellent* and 20.6 per cent *satisfactory.* This would indicate that there is a decided tendency to give unduly high ratings to senior and unduly low ratings to junior officers.

The comparison of ratings for 1937 indicate that this tendency still exists. Roughly, the ratings for this year were: colonels 39.0 per cent *superior,* 56.0 per cent *excellent,* and about 4.0 per cent *very satisfactory;* whereas 2d lieutenants were 10.0 per sent *superior,* 52.0 per cent excellent and 30.0 per cent *very satisfactory.*

Instructions on War Department Form No. 67, July 1, 1936 clearly state that when rating an officer, consideration should be given to length of service and the opportunities afforded him. In the past, as indicated by the above comparison of ratings, this has not been done. Consequently, reporting officers, bearing this in mind, should consider carefully the length of service of the officer being reported upon and also his opportunities for securing results. If an officer is compared with his equals in length of service and opportunities, and not with older and more experienced men, or with men who have had greater opportunities, there is no reason why there should not be as many superior lieutenants as superior colonels.

NATIONAL GUARD AND RESERVE OFFICERS

In the preparation and rendition of efficiency reports on National Guard and Reserve officers the same principles apply as outlined for Regular Army officers.

The reports on National Guard officers are rendered on War Department, National Guard Bureau Form No. 67. These reports follow the same general procedure prescribed for officers of the Regular Army. However, the rendition of the report varies, depending on whether the

National Guard officer is detailed for duty under War Department orders or performs duties or receives instruction under state jurisdiction. When under state jurisdiction the report is rendered as prescribed in Army Regulations for officers of the Regular Army. The report is compiled by the officer's immediate commanding officer within the state. It is then forwarded through the state chain of command to the State Adjutant General who forwards the report to the Corps Area Commander for transmission to the Chief of National Guard Bureau. The Chief of the National Guard Bureau classifies the officers into classes *A* and *B*. Class *B* officers are reported to the state for necessary action. When a National Guard officer is detailed for duty by the War Department and is under War Department jurisdiction, he is rated on War Department, A.G.O. Form No. 67 in a similar manner to officers of the Regular Army.

National Guard officers are not given general ratings in the same manner as Regular Army officers.

Reports on officers of the Organized Reserves are rendered on War Department, A.G.O. Form No. 67 marked *Reserve*. In peace time reports are rendered at the conclusion of a period of active duty, or instruction or observation with the Regular Army on an inactive status, except for flying training. The report is forwarded through military channels to the corps area commander having jurisdiction over the reserve officer, for file, provided the officer is in the "territorial assignment group". If he is in the "arm and service assignment group" his report is sent to the chief of arm or service concerned; or to the Adjutant General if in the "general assignment group". However, when the period of active or inactive duty exceeds three months, the report is rendered as prescribed for officers of the Regular Army.

PARAGRAPH E

The instructions given on the efficiency report form as to the entries to be made under paragraph *E* of the

form are ample. It should be noted here, however, that the ratings assigned to the manner of performance of duties enumerated should be consistent with those assigned under paragraph *F* and also under paragraph *H*.

There are two methods of approach in deciding on ratings to be assigned under this paragraph: the first is to give the officer being reported upon the general rating which one considers he merits and then arranging paragraphs *F* and *H* to conform to this general rating. The second is to omit temporarily the completion of paragraph *E*, but complete paragraphs *F* and *H*. From this it is possible to determine the average of all the items in these paragraphs. This average can then be placed in paragraph *E* as the general rating. The first method is considered the more acceptable one as it is believed that by this method a more consistent report will be rendered.

It should also be noted that under this paragraph the rating officer is required to line out inappropriate words in the last part of the paragraph or amplify under *Remarks*.

When an officer is serving in a dual capacity, both of his duties being under the *same* immediate superior, the entries under paragraph *E* will show first the major duty, together with the period covered by the report and the manner of performance. This will be followed by the secondary duty or duties, together with the period of the secondary duty or duties and the manner of performance of each. However, in such cases of concurrent duties reporting officers will indicate the principal duty performed by the officer by adding after the entry the words "Principal duty." As an example:

Executive officer (Principal duty)	10 mo	Superior
Supply officer	8 mo	Excellent
Mess officer	6 mo	Very satisfactory
Athletic officer	10 mo	Excellent

When an officer is serving in dual capacity under *different* immediate superior officers, the report will be

rendered by the officer's immediate superior, as determined by the major duty the officer is performing, no entries being made under paragraph *E* of duties other than the major duty. Secondary duty or duties, together with manner of performance, will be noted in the indorsement of the officer who is the superior of the officer being reported upon and who detailed him to the secondary duty in question. Thus an officer detailed as regimental athletic officer—a duty secondary to his company work—would be rated on his efficiency as athletic officer by the regimental commander in his indorsement.

PARAGRAPH F

Paragraph *F* should bear out and amplify the rating given in paragraph *E*. As no individual can be entirely uniform in his characteristics and attainments, uniformity in these listed items should seldom be found.

This paragraph deals for the most part with handling troops under various situations. The ratings given here must be based on personal observation or official reports. In the absence of both, the entry should be *unknown*. To rate the performance of administrative and executive duties, some reliance, naturally, must be placed on observation as to how the officer handled his paper work during the period. For a company commander this would include especially mess and company fund accounts, clothing records, and general administration of the unit he is commanding.

PARAGRAPH G

Here should be listed those specialties often not thought of in connection with the military, but which frequently add materially to an officer's value to the service, particularly in time of war. As examples of such specialties, the following are offered: accounting and auditing; athletics and coaching; various types of engineering; motor transportation; cryptography; public speaking; editing, proofreading and newspaper work.

PARAGRAPH H

The qualifications listed in this paragraph must also be in general agreement with those in paragraphs *E* and *F*. After rating the officer under the ten subjects listed the rating officer should carefully check over paragraphs *E*, *F*, and *H* to see that he has been entirely consistent in his rating in all three paragraphs.

Although a brief definition is given on Form 67 of each qualification in this paragraph, a further elaboration of these definitions, as given below, has been found of value.

PHYSICAL ACTIVITY (agility, ability to work rapidly).—Hustle and bustle—which results in confusion—should not be considered as the ability to work rapidly. Rather, under this heading, as it now implies, should be indicated the degree to which the officer has been *efficiently* active, energetic, quick—both bodily and *mentally*.

PHYSICAL ENDURANCE (capacity for prolonged exertion).—Here too, one should not be misled into thinking an officer has little enduance because he is not frequently seen indulging in strenuous activity to the point of near exhaustion. The less noticeable, more self-contained individual might well be the one to stand up longer through a succession of trying, hard days. If an officer has had a severe illness, or has undergone a recent operation, and there is any question as to his condition, let it be determined by a medical board.

MILITARY BEARING AND NEATNESS (dignity of demeanor; neat and smart appearance).—One need not be austere to be dignified; nor are haughtiness, a dictatorial manner, snobbishness, or aloofness, to be mistaken for dignity. One might perform the most menial tasks with true dignity.

Pride in personal appearance is a degree of evidence of self-esteem and respect, but even more is it a sign of respect for one's commission, and for the service. An

officer presents a constantly good appearance at no little expenditure of money, time and effort. Therefore, and particularly because his care in that way is indicative of his attitude in other ways, he should be carefully rated on this item.

ATTENTION TO DUTY (the trait of working thoroughly and conscientiously).—In considering an officer with respect to this item, one might ask: To what degree does he perform every assigned task, promptly, completely, better than normally expected or required? Does he subordinate to his work his own convenience, comfort and need? Does he put duty first?

COOPERATION (acting jointly and effectively with others, military or civilian, to attain a designated objective).—This is a new paragraph replacing *tact* on the old form and needs no explanation here.

INITIATIVE (the trait of beginning needed work or taking appropriate action on his own responsibility in the absence of orders).—One who does only what he is told to do, or who continually asks how to do it, lacks initiative. The other extreme is the abuse of general authority given. Between these extremes is the officer who thinks and sees for himself, weighs the need and desirability of the task perceived, and then goes ahead with its accomplishment.

INTELLIGENCE (the ability to understand readily new ideas or instructions).—The ability to coordinate a new fact or idea with what is already known, indicates intelligence. It should be assumed that an order, for example, embodies a decision thoughtfully arrived at. It consequently merits and requires thought to carry it out. Therefore, granting that a decision is thoughtfully arrived at and is clearly expressed in an order, the failure to grasp the spirit or comprehend such an order shows lack of intelligence.

FORCE (the faculty of carrying out with energy and resolution that which on examination is believed to be reasonable, right, or a duty).—Here is meant exactly what is stated. Some, however, misguidedly think it means bluster, loudness, a dogmatic or dictatorial manner, or plain stubbornness—all summed up in the phrase "hard-boiled". This is a common and gross error.

Rather that officer possesses force who, without antagonizing others, calmly and uniformly exacts efficient performance from his subordinates and thus he gets things done smoothly, quickly, and efficiently.

JUDGMENT AND COMMON SENSE (the ability to think clearly and arrive at logical conclusions).—This means just plain common sense, "gumption", intuition, and ability to stick to the subject. Little more can be said, perhaps, other than it does not mean "snap judgment", and that it may be developed by a conscious, methodical effort toward deliberate thought on every question presented.

LEADERSHIP (capacity to direct, control, and influence others in definite lines of action or movement and still maintain high morale).—It may be defined also as the art of imposing one's will upon others, in such manner as to command their obedience, their confidence, their respect, and their wholehearted cooperation.

After paragraph *H* and before paragraph *I* on the reverse side of Form No. 67, at the top of the page, (See Plate II) is a place for the name of the officer reported on and the name of the reporting officer. These should agree exactly with the names shown in paragraphs *A* and *S*. The grade and arm or service are not entered here.

Name of officer reported on ..... **Name of reporting officer** .....

I. During the period covered by this report has he taken advantage of the opportunities afforded him to improve his professional knowledge? .....

J. Has he exhibited any weaknesses—temperamental, moral, physical, etc.—which adversely affect his efficiency? ..... If yes, describe them. (**FACT** or **OPINION.** Line out one.) .....

.....

K. Proper authority having decided on the methods and procedure to accomplish a certain end, did he render willing and generous support regardless of his personal views in the matter? .....

L. Since last report has he been mentioned favorably or unfavorably in official communications? ..... (See par. 1b, AR 600–185.)

M. During the period covered by this report was he the subject of any disciplinary measure that should be included on his record? ..... *If yes, enclose separate statement of nature and attendant circumstances.*

N. Write a brief general estimate of this officer in your own words .....

.....

.....

.....

.....

O. How well do you know him? .....

P. Remarks (including entry required by par. 11a, AR 600–185) .....

.....

.....

.....

.....

Q. In case any unfavorable entries have been made by you on this report, were the deficiencies indicated hereon brought to the attention of the officer concerned while under your command and *prior* to the rendition of this report? ..... If yes, what improvement, if any, was noted? .....

.....

If no improvement was noted, what period of time elapsed between your notification to him of his deficiencies and the rendition of this report? .....

E. Based on your observation during the period covered by this report, give in your own words your estimate of his **GENERAL VALUE TO THE SERVICE** .....

.....

.....

S. I certify that to the best of my knowledge and belief all entries made hereon are true and impartial and are in accordance with AR 600–185.

(Signed) .....
(Name typed) .....
(Grade and Org.) .....
(Comdg. what?) .....
(Place) .....
(Date) ..... Incls. .....

1st INDORSEMENT

Write nothing below this line.

U. S. GOVERNMENT PRINTING OFFICE 3—4308

PLATE II—Reverse of the Efficiency Report Form.

PARAGRAPH I

If the officer reported on is a student at a school, his attitude will indicate whether or not he is taking advantage of the opportunities afforded to improve his professional knowledge. In any case, the rating officer must have definite knowledge of the subordinate before he can answer this question intelligently and fairly. When the subordinate is always prepared for his daily work and shows interest beyond the perfunctory execution of routine duties, such preparation and interest are indications that this question can be answered affirmatively.

PARAGRAPH J

The type of weaknesses contemplated here are such as those formerly listed in paragraph 8 *d*, AR 600-185; for example, vices or habits that tend to corrupt the individual and lower the professional standard; lack of self-control; bad temper or other traits that tend to lower the individual's efficiency. If the remark be unfavorable, then the provisions of paragraph 8, AR 600-185 apply.

The words *Fact or Opinion*, one of which must be lined out, should be understood by all rating officers. By *fact* is meant "anything done; an act; an event; a circumstance; an effect produced or result achieved." In other words, if an entry of *fact* is made, it must be of some act or event which has come under the direct observation or personal knowledge of the rating officer. An *opinion* is "a notion or belief stronger than an impression, less strong than positive knowledge." In order to insure uniformity, Circular No. 1, War Department, January 2, 1936, provides an administrative classification, as to opinion or fact, of all information and data, given under the various paragraphs of the efficiency report.

PARAGRAPH K

Willing and generous support includes true, loyal effort to carry out the superior's intent. Once the superior has given his decision, then the question of willing and generous support hinges upon the manner in which the subordinate carries out the intent, regardless of his own views.

PARAGRAPH L

The subject of favorable and unfavorable communications is covered in paragraphs 1 *b* and 8, AR 600-185; War Department Circular No. 1, 1936; and AR 600-10. Favorable communications—such as letters of commendation—should be based upon personal observation by the officer writing the commendation, or upon official reports or inspections. If the commendation is from an officer not in the channel through which the commended officer's efficiency report passes, it should be furnished to the latter's immediate superior for attachment to his report.

PARAGRAPH M

Paragraph *M* provides a place for the inclusion of any record of disciplinary action taken against the officer reported upon. The War Department does not intend that under this paragraph there should be entered, and thus made a matter of record, every trivial offense the individual may have committed. Minor deficiencies should be brought to the attention of the officer concerned at the time noted and the commanding officer should by counsel, advice, example, and, when necessary, by disciplinary measures assist the individual to overcome his deficiencies. This matter is completely covered in the Army Regulations and in the Manual for Courts-Martial. Paragraph 2 (b) AR 600-10 states that trivial offenses which have been promptly and properly corrected, when brought

to the attention of the officer concerned, need not be noted on the officer's record, and will be considered as closed incidents. Paragraph 10 *d*, AR 600-185, is considered highly important. It reads, "When for a trivial offense the record of a case under the one hundred and fourth Article of War is appended to an officer's efficiency report, it will include a statement by the commanding officer that less drastic methods of maintaining discipline in his command have been applied to the individual concerned, but without result." If an admonition or reprimand is verbally administered and the individual fails to appeal, it will be affirmatively so stated in a separate statement in this paragraph.

PARAGRAPH N

Paragraph *N* calls for a word picture of the rated officer. The reporting officer should exercise particular care that his word picture, given in this brief estimate is not inconsistent with other entries in the report. At the same time equal care should be exercised not to duplicate under this heading what has already been rated in other parts of the report, particularly in paragraph *H*. For instance, *Leadership* is rated elsewhere and it is not necessary to mention it here, unless the quality of leadership—good or bad—is so extraordinary that it needs some explanatory remark. The same applies to other qualities being rated. On the whole, such explanatory remarks will be uncommon since the report in itself, when properly made out, is complete—even exhaustive.

In order to assist the rating officer to picture an officer exactly as he sees him in his mind, the following tabulations with lists of words are furnished. The list is not to be regarded as mandatory, nor does it contain, by any means, a complete list of words that might be used. It is only suggestive in nature. A perusal of the lists will be helpful in selecting—or suggesting—the word or words which will express the exact shade of meaning desired. Sometimes it will be advisable to check the pre-

cise meaning of the word in a dictionary. The rating officer should not only use the exact word, but he should know precisely what meaning it conveys to others. There should be no question of misrepresenting or misunderstanding what is meant.

The following pages represent an effort to afford help in outlining a personality by classifying certain traits under such headings as *manner, presence, character,* and the like. It is not to be understood that this is a scientific "break-down" of a personality into its constituent parts. It is merely an attempt to simplify the task of the rating officer by offering him a list of descriptive words and by drawing his attention to personality qualities often overlooked, and to do all this in simple, non-technical terms.

MANNER.—(Outward qualities.) This category needs no explanation. It is self-explanatory.

commanding	dynamic	magnetic	courteous
engaging	amiable	well-mannered	bright
alert	affable	diplomatic	urbane
suave	polished	bland	benign
gracious	genial	kindly	receptive
frank	likeable	pleasant	pleasing
easy	considerate	convincing	conciliatory
warm	boisterous	loquacious	verbose
talkative	animated	sedate	serene
calm	tranquil	composed	mild
deliberate	unassuming	earnest	reserved
taciturn	retiring	restrained	unobtrusive
austere	unresponsive	shy	aloof
cold	frigid	affected	blunt
curt	brusque	crude	obtrusive
disdainful	inconsiderate	offensive	obsequious

PRESENCE.—(Outward qualities.) This is the unit mental impression that certain officers produce on others. Occasionally an officer will have a real and definite *presence* which can be summed up in one word, such as *attractive.* However, it must be recognized that this presence—so called—is often compounded of minor personality traits which make a definite and rounded impression

on the observer. In such cases, often the better way of summing up the officer is to ascertain by analysis what these minor traits are and then list them.

On the other hand, an officer's *presence* may be characterized by some outstanding trait which everyone at first contact recognizes and thereafter, consciously or unconsciously, mentally affixes to the officer. In this respect note the word *slovenly*. Compare this word with the word *impressive*. What causes an officer to give a slovenly impression could easily be listed but is not necessary. The word *slovenly* is sufficient. But what makes him *impressive* is often baffling and not easily ascertained without study, nor does the word carry a cleancut image to the reader. Therefore it may be necessary at times to analyze and list the qualities that make the individual impressive. However, proper selection of words under other headings will round out this picture.

distinguished	impressive	dignified	attractive
immaculate	spruce	neat	tidy
dapper	foppish	colorless	sober
severe	pompous	untidy	slovenly
unimpressive	undistinguished	undignified	unattractive
odd	eccentric		

DISPOSITION.—(Outward qualities generally denoting possession of inward mental or emotional traits.) An officer possessing one or more of these qualities may impress the rating officer favorably or unfavorably but this is not to be taken as a sign that the officer is what he appears on the surface. Do not rate his personality or character on these surface qualities alone. The rating officer should not make a long mental jump and conclude that an officer outwardly reflects inward qualities—though quite often this is true. For instance a *cheerful, tactful* man with a *generous* disposition may be all that he seems and yet in character be *weak, cautious,* and *disloyal* when pressure is put on him. Again he may have none of the finer inward qualities that certain outward qualities suggest, but is using them for a front—con-

sciously or unconsciously. At the same time a *morose, gloomy* individual who has occasional periods of *irritation* may be *steady,* thoroughly *loyal* with a high degree of *moral courage* and absolutely trustworthy. Yet too often he will not receive credit for his sterling worth.

spirited	impetuous	impulsive	animated
excitable	good-humored	humorous	cheerful
good-natured	good-tempered	helpful	generous
tactful	cooperative	adaptable	forbearing
complaisant	lenient	indulgent	quiet
pacific	placid	mild	phlegmatic
serious	retiring	indifferent	evasive
insipid	gullible	submissive	spiritless
meek	gloomy	pessimistic	morose
irritating	conceited	obstructionist	impotent
ill-tempered	hypercritical	supercilious	complaining
fault-finding	resentful	truculent	

CHARACTER.—(Inward traits, to be learned only after long and close association.) A man's character is his most precious asset. Too much care cannot be taken in selecting the exact words to describe it. One can make a mistake in describing other personal attributes and the harm will not be so great, but no mistake can be tolerated here. Unless the rating officer knows the subordinate's character he should not attempt to use this word. He should confine himself to the things he knows. These would certainly be *manner, presence, disposition, mentality,* and the like.

audacious	venturesome	bold	aggressive
unswerving	dominant	dominating	firm
stable	self-controlled	courageous	tenacious
self-reliant	resolute	determined	domineering
cautious	flaccid	negative	superficial
shallow	fickle	time-serving	dependent
unstable	unsteady	irresolute	timid
weak	idealistic	altruistic	unselfish
self-sacrificing	magnanimous	sincere	tolerant
faithful	trustworthy	unbiased	just
open-minded	broad-minded	earnest	thoughtful
opinionated	narrow-minded	arbitrary	biased

hypercritical	bigoted	selfish	intolerant
untrustworthy	disloyal		

loyal (to superiors; to subordinates) (unquestioned, excellent, good, average, fair, indifferent, poor)
(seeks, avoids, accepts) responsibility

MENTALITY.—(Type of, and ability to use intellectual equipment.)

original thinker	creative	independent thinker	imaginative
analytical	brilliant	astute	perspicacious
clever	able	keen	bright
sharp	quick-witted	agile-minded	quick-thinker
versatile	ingenious	judicial	calculating
discerning	logical	sound	careful
level-headed	long-headed	far-sighted	balanced
practical	theoretical	academic	formalist
normal	medium	ordinary	average
mediocre	undistinguished	unimaginative	inept
impractical	one-track mind	second-rate	dull
obtuse	unwise	inane	stupid

KNOWLEDGE.—(By knowledge is meant the amount of subject matter an individual possesses, and not necessarily his ability to use it. Knowledge should not be mistaken for intelligence or wisdom.)

intellectual	scholarly	cultivated	learned
accomplished	lettered	erudite	well-grounded
widely-read	well-read	enlightened	dabbler
shallow	smatterer	half-scholar	unconversant
uninformed	unlettered	unlearned	unerudite
unscholarly	ignorant	dense	crass
thick			

informed (highly, well, moderately, poorly) on (world affairs, professional affairs, cultural matters)

APPLICATION.—(An emotional quality, the product of many factors, which manifests itself in the way the individual attacks and carries through his problems or duties.)

zealous	enthusiastic	energetic	rapid
quick	persistent	diligent	untiring
tireless	industrious	determined	thorough
precise	painstaking	methodical	deliberate
punctilious	meticulous	resourceful	willing
steady	intermittent	casual	slow
sluggish	unresourceful	indifferent	vacillating
careless	negligent	procrastinating	indolent
lazy	initiates action (speedily, slowly, excellently, well, reluctantly, fails to) performs duties (speedily, slowly, excellently, well, hesitatingly, fails to)		

RESULTS.—(Degree, kind, or type of results obtained.)

unfailing	certain	decisive	positive
unquestionable	unmistakable	efficient	reliable
sure	excellent	effectual	successful
good	accurate	capable	dependable
quick	fair	adequate	ordinary
moderate	presentable	passable	tolerable
undistinguished	commonplace	questionable	second-rate
inaccurate	unreliable	ineffectual	defective
inefficient	below-par	faulty	unsatisfactory
poor	worthless		

In using the foregoing list of words, several methods are applicable. For instance, an officer may be described as follows: "He is alert, cheerful, self-reliant, quick-witted, diligent and obtains excellent results." If the rating officer is not sure of the character, the word "self-reliant" can be left out. On the other hand the rating officer, if he knows the officer thoroughly, may need to use several words from the character group in order to give an accurate picture of him. He might add to "self-reliant" the words "idealistic" and "trustworthy" which helps to round out the picture. In the same manner it may take more than one word to describe him under other heads. For instance, with reference to *results* the rating officer might say: "and obtains excellent results quickly and accurately." The whole remark, as thus built up, would now read as follows: "He is alert, cheerful, self-reliant, idealistic, trustworthy, quick-witted, diligent and obtains excellent results, quickly and accurately."

It is not always necessary to go to such length in picturing an officer but the better a rating officer knows his subordinates, the more likely he will need one or more words from one or more of the classifications given. The less he knows the officer the fewer words will be needed to picture him in the remark. For example, the officer pictured in the remark above if only silghtly known by the rating officer might have a remark as follows: "He is an alert, cheerful and diligent officer." Note that these are obvious characteristics. Only further association would bring out such personal attributes as *self-reliant, idealistic, trustworthy, quick-witted,* and that he secures *excellent results, quickly and accurately.*

While for the most part the words as listed under each heading may be given alone, sometimes to obtain clarity it will be necessary to include the group heading. For example, to use the phrase *calculating officer* is vague and does not convey the correct meaning—in fact it may have a derogatory connotation. However, by including the word *mentality* we get the phrase *calculating mentality.* This is precise and definite, and has no derogatory meaning. Words of such nature—and there are many of them —wherever they occur in the categories should be accompanied by the proper heading.

At the same time, by using the group heading, it is often possible to use a word from another group to convey a fine shade of meaning. For instance, we can take the word *resourceful* from under the heading APPLICATION and by attaching the word *thinker* we get the phrase *resourceful thinker* which quite properly belongs under the heading MENTALITY.

Thus the rating officer should not look upon these lists and groupings as being fixed, definite and incapable of change. They are merely a help to the rating officer; they do not form a mechanism for grinding out conventional personality portraits with a minimum of thought. Their sole function is to help convert thought into words.

PARAGRAPH O

This paragraph is self-explanatory. Its purpose is to indicate the weight which should be given to those portions of the report which are based on the degree of acquaintance. This may be indicated by words such as the following: slightly—fairly well—very well—intimately—thoroughly.

PARAGRAPH P

This pargaraph should be used for facts or opinions which would complete entries made elsewhere; or where space provided was insufficient; or this paragraph may be used to give special information concerning an officer, which could not be entered appropriately elsewhere. Here (for Regular officers only) should be stated special suitability for civilian contact or for duty with any one or all of the civilian components. Here, also, in case of a delayed report should be given any explanation why the report was delayed beyond the period of ten days prescribed in paragraph 14 *a* (1) AR 600-185.

PARAGRAPH Q

In this paragraph, the reporting officer is required to state whether or not he has called any deficiencies to the subordinate's attention. In case the reporting officer has failed to bring an individual's deficiencies to his attention prior to the rendition of the report he will make the necessary explanation in this paragraph. The junior should have his deficiencies pointed out to him when they occur and prior to the rendition of the report, and the report should indicate the degree to which the deficiencies were corrected. Failure of commanding officers to make corrections as indicated above is considered negligence of duty on the part of commanding officers. Where these deficiencies are such as to be embodied in the efficiency report, it is

advisable to make them a matter of record in an official communication prior to their entry on the report.

PARAGRAPH R

This paragraph is probably as important as any in the report. Here the reporting officer must state definitely his estimate of the junior's present and future value to the service, and before so doing, should carefully review the entire report so that this paragraph will be consistent with those which precede it. This paragraph should be in the reporting officer's own words.

It is different from paragraph *N* in that it contains, in addition to a statement relative to present value, a prediction as to what may be expected of the officer in the future, or, in other words, an expression of the reporting officer's opinion as to the officer's potential value to the service.

Under this paragraph an officer should be regarded from two viewpoints. First, what is his immediate value to the service? Is it great or small, and specifically what does it consist of? Second, what is his potential value to the service? The latter is most important. It is entirely possible that an officer's immediate value may be great but his potential value small or limited. Contrariwise his immediate value may be small or limited but his potential value great. Of the two it is the prediction made as to future value that is the more important to the army and to the officer being rated.

In most cases the present value of an officer is clearly indicated by other entries on the report and therefore no mention is necessary under this paragraph. However, it will sometimes be necessary to indicate his present worth in order to avoid what might appear to be a glaring inconsistency in the report. An officer may justly earn an excellent report but his potentiality may not be great—for instance, he might lack basic education which would impede or prevent his future development. Under such circumstances it is better to indicate that his present

value is high—which would be consistent with the report—but that his potential value is low, and give the reason for this low potentiality. How this may be done concisely is shown in the words and examples listed below, which indicate one method of analyzing an individual's present and potential value to the service and consequently reducing it to a short, exact remark:

Present value.—Superior—excellent—very high—very good—high—good—fair—limited—mediocre—poor—very poor.

Potential value.—He has the highest (very high, high, good) potentiality for any class of duty.

He has (limited) (little) (small) (mediocre) (poor) (very poor) potential value.

He has ..... potentiality, especially for .....duty.

He has potentiality for .....

He has a potentiality which is limited on account of.....

.....

The examples given below will indicate how a remark may be made up from the above arrangement of the subject. The words in parentheses indicate the wide scope that this method permits the rating officer, and will suggest other words that may be used and thus indicate how any type individual may be pictured under this heading:

"He has a high present value and great potential value, particularly for (an instructor in service schools) (rifle marksmanship) (motor maintenance) (animal management) (duty with civilian components) (troop commander) (staff duties) (etc.)."

"He has a good present value but limited potential value due to (inability to master academic subjects) (inability to impress himself on civilian groups) (slowness in grasping new ideas) (undue conservatism) (undue radicalism) (inability to absorb higher training) (inability to apply higher training) (etc.)."

PARAGRAPH S

Before the officer signs this report, he should be certain that all paragraphs and subparagraphs have been completed appropriately and that there are no omissions. If any inclosures are included with the report, they should be numbered and their total recorded opposite "Incls."

REVIEW BY NEXT HIGHER AUTHORITY

The careful review of all efficiency reports is an obligation imposed by Army Regulations upon all next higher commanders. Under our present system immediate commanding officers exercise great latitude in making out efficiency reports. Safeguards against the abuse of the immediate commander's prerogatives exists in the careful review of reports by the next higher commander. The original report, and not the forwarding indorsements, should show a true picture of the officer reported upon. If the immediate commander's report shows evidence of personal prejudice, lack of knowledge, or misinterpretation of the spirit of the rating instructions, the next higher commander should take corrective action.

RENDITION OF REPORTS

In general, an efficiency report will be rendered on any officer who has served continuously under the direct command of another for more than one month, provided his service ceases prior to June 30, or in any event on June 30, for Regular officers or December 31 for National Guard officers.

TYPES OF REPORTS

FULL REPORTS.—A full report (all paragraphs) will be rendered whenever the period of duty covered by the

report is more than three months and for other reasons given in paragraph 5, AR 600-185.

ABBREVIATED REPORTS.—An abbreviated report will, or a full report may, be submitted when the total period of continuous service is less than three months and more than one month. In an abbreviated report, paragraphs *A*, *B*, *C*, *E*, *L*, *M*, *Q*, and *S* are required; others are optional.

SPECIAL REPORTS.—Special reports will not ordinarily be rendered for a period of one month or less, but may be rendered if, in the opinion of the reporting officer, the service appears to have been unusual, either through merit or lack thereof.

SPECIAL SCHOOL REPORT.—Students at schools will have, after completion of each school term, a special school report rendered upon them by the Commandant of the school.

NON-DUTY PERIODS.—Whenever the report covers a period of duty as well as non-duty, such as sickness or leaves of absence, the latter will be entered separately under paragraph *E*. A period of non-duty will not be counted in computing the total period covered by the report for the purpose of determining the kind of report required, whether full or abbreviated.

When the commanding officer of an organization is temporarily absent for a short period of time, for example for 10 or 15 days, or at any rate for less than one month, it is presumed that the officers under him do not cease to serve, as contemplated by paragraphs 5 (1) (a), AR 600-185, and consequently efficiency reports are not ordinarily rendered. This short period is included in the report as subsequently rendered by the commanding officer. No cognizance is taken of the commander's absence. Should the absence be longer than one month, the efficiency reports are rendered. Subsequently the temporary com-

manding officer renders reports, for the period of absence (when he was temporarily in command). The type of report rendered will depend upon the length of time the temporary commander is in command, as provided in paragraph 5, AR 600-185.

UNFAVORABLE ENTRIES

In paragraph 8, AR 600-185, and changes contained in Circular No. 1, War Department, it is directed that whenever an efficiency report contains entries which may be considered in any sense unfavorable, the reason for the entry will be clearly stated, and the report will be referred by indorsement to the officer reported upon, for remark. The rating of *unsatisfactory* will be considered as unfavorable. Any comment which detracts from an officer's reputation by ascribing derogatory qualities will also be considered as unfavorable.

Reference by indorsement to the officer reported upon for remark will be made whenever the report contains unfavorable entries, irrespective of whether they be entries of fact or opinion.

These provisions are applicable also to the next (or a higher) military superior to whom the report goes for action. Should the latter in his forwarding indorsement give a rating of *unsatisfactory* or make any unfavorable entry, he too must indorse the report for remark to the officer reported upon.

If the forwarding of the report will be unduly delayed by reference to the officer reported upon, a copy of the report will be forwarded at once with a statement that the original has been referred to the officer reported upon, and the original will be forwarded as soon as returned. For further discussion of unfavorable entries, see AR 600-185, AR 600-101, and Circular No. 1, War Department, 1936.

NOTATION OF DISCIPLINARY ACTION

In case any report of disciplinary action is made, the original communication, covering the matter, together with the record of any appeal that may have been made and the action taken, is attached as a part of the efficiency report rendered. If the report includes any reference to a verbal admonition or reprimand, and the officer concerned has made no appeal, that fact must be noted affirmatively in the separate statement required by paragraph *M* of the form.

FORWARDING REPORTS

The following method of forwarding reports is given in some detail so that all concerned may be cognizant of the correct manner of handling reports particularly those having unfavorable entries.

a.—Procedure with reports having unfavorable entries:

(1) Indorsements:

1st Ind.

(From reporting officer to officer reported upon.)

"Referred to you for remark in compliance with paragraph 8, AR 600-185."

2d Ind.

(From officer reported upon to reporting officer.)

Here the subordinate being rated will include any remarks he may desire to make in connection with the unfavorable entries. He will confine himself to these unfavorable remarks in writing his indorsement and not write in generalities.

3d Ind.

(From the reporting officer to the next superior.)

Either transmittal indorsement or any remark he may desire to make with reference to statements of officer reported upon.

(2) If the forwarding indorsement of the next or a higher military superior contains any new matter unfavorable to the officer reported upon, or if a military superior reduces to *unsatisfactory* any rating of *satisfactory* or above, the entire report, including indorsements, will be referred to the officer reported upon.

b.—General procedure regarding indorsements:

(1) By next military superior.—(Over his own signature, Circular No. 8, War Department, January 22, 1937.)

(a) "I concur in the above report", or

(b) "I concur in the above report except that under paragraphs 'F' 2 and 3 and 'H' 7 and 10, I would rate this officer 'excellent', and under paragraphs 'F' 6 and 'H' 6 and 8, I would rate this officer 'very satisfactory'."

(c) "I do not know the officer reported upon but I have confidence in the judgment, spirit of fairness, and impartiality of the reporting officer", or

(d) "I do not know either the officer reported upon or the reporting officer and cannot express an opinion."

(2) By higher commanders.—

(a) "Examined and forwarded", or

(b) "Examined and forwarded", followed by whatever comment it may be desired to make.

(c) Indorsements by higher military commanders will contain in paragraph 1, "Examined and forwarded", and in succeeding paragraphs any remark they may desire to make. If, in such indorsement, comment other than "Examined and forwarded" is made, the responsible commander will sign the indorsement. (Circular No. 8, War Department, January 22, 1937.)

CLASSIFICATION OF OFFICERS

Regular Army officers are classified to determine relative efficiency and class of duties performed. A list of general and special professional qualifications is recorded to aid in making intelligent assignments.

A very complete system has been worked out for this classification and the principal source of data for classi-

fication is the periodic efficiency reports. When efficiency reports are received in the office of the Adjutant General, Washington, D. C., they are transmitted to the appropriate chief of arm or service. There, selected important items are extracted into a form called the *Transcript of Efficiency Report.* After additional evaluation of the previous year's data, the critical items are entered on a master form called the *Synopsis of Record.* This is convenient for quick reference, and is useful in determining eligibility for preferential assignments, as, for example, The Command and General Staff School. Thus it will be noted that an officer's entire record is considered in connection with his classification.

The new data is, for each officer, now transmitted to the office of the Adjutant General, where it is copied into an *Abstract of Record Card,* which is maintained in that office. This might more properly be called a classification card. Additional entries, covering service schools attended, commendations, and other items are entered on the reverse side of the card.

AR 605-155 prescribes that each officer will be given a general rating and an annual rating.

The general rating is an official evaluation of an officer's performance of duty for the preceding five years, computed by his chief of arm from the combined annual ratings for those years. The general rating indicates the manner in which the officer may be reasonably expected to perform any duty commensurate with his grade and experience.

The annual rating is an official evaluation of an officer's performance of duty for one fiscal year computed by his chief of arm, based upon a careful consideration of all of the officer's efficiency reports and other data of record for that year. In addition, the following points are considered:

(a) Importance of major duty performed during period.

(b) Opportunity of reporting officer to observe the performance of duty.

(c) Length of period covered by the report.

(d) Age, experience, judgment, and rating equation of the reporting officer.

(e) Concurrence or nonconcurrence or other remarks of any superiors in the chain of command.

SUMMARY

The object of the efficiency report is to give the War Department a clear and concise picture of the officer reported upon, as seen through the eyes of the reporting officer. In order to accomplish this, due care must be exercised by the reporting officer in the preparation of the report. If inconsistent entries are made, or if certain details called for by Form No. 67 are omitted, the whole purpose of the report will be vitiated. Unfavorable entries and notation of disciplinary action should be made only in accordance with Army Regulations and the Manual of Courts-Martial. The whole report, upon completion, should be carefully checked for errors, and, then, to be of any value, must be submitted promptly. Reporting officers must closely follow the prescribed principles for the preparation and rendition of efficiency reports in order that a uniform classification of officers can be made by the War Department.

In conclusion, it should be remembered that although information, advice and the opinions of others may be sought, the rendering of efficiency reports is a responsibility which cannot be delegated. It is a highly important function of command. The perfunctory rendition of efficiency reports does a grave injustice to the government and the officer being rated. Consequently, no effort should be spared to make out these reports as accurately as is humanly possible.

APPENDIX I

CHECK LIST—EFFICIENCY REPORTS

PARAGRAPH A

..... 1. Does the name of the officer being reported upon agree exactly with his name in the Army Register?
..... 2. Is the serial number correct?
..... 3. Is the grade correct?
..... 4. Is the organization correct?
..... 5. Is the status of the officer being reported upon correctly stated?

PARAGRAPH B

..... Is the period covered by the report correctly stated?

PARAGRAPH C

..... Is the entry of stations at which served correctly entered?

PARAGRAPH E

..... 1. Are the duties performed correctly stated?
..... 2. Is the time correctly stated?
..... 3. Are the ratings given under "Manner of Performance" consistent with ratings given under paragraphs *F* and *H*?
..... 4. Have inappropriate words been lined out?

..... 5. Does the period of principal duty, leaves of absence, temporary duty and detached service equal the period covered in paragraph *B*?

PARAGRAPH F

..... Does this paragraph bear out and amplify ratings given in paragraph *E*?

PARAGRAPH H

..... Are the ratings in this paragraph in general agreement with those in paragraphs *E* and *F*?

Reverse side Form 67

..... Do the names of the officer being reported on and the reporting officer agree exactly with the names shown in paragraphs *A* and *S*?

PARAGRAPH J

..... Fact or opinion—is one of them lined out?

PARAGRAPH N

..... 1. Is there anything in this estimate that may, in any way, be construed as a derogatory remark?

..... 2. Are the remarks under this paragraph consistent with ratings given in paragraph *E*?

PARAGRAPH P

..... 1. If the report is delayed over ten days, is an explanation given here?

..... 2. Is the officer's special suitability for civilian contact, or for duty with any one or all of the civilian components, stated?

PARAGRAPH Q

..... Has this paragraph been completed?

PARAGRAPH R

..... Are the remarks in this paragraph consistent with the ratings in preceding paragraphs?

PARAGRAPH S

..... 1. Is the report signed?
..... 2. Is the report dated?
..... 3. Are inclosures, if any, noted?

INDORSEMENTS

..... If report has not been referred to officer reported upon, is there any entry in the report which might be considered unfavorable?

BY THE NEXT MILITARY SUPERIOR

..... Is it signed personally in accordance with Cir. No. 8, W.D. 1-22-37?

BY HIGHER COMMANDERS

..... If the indorsement is other than "Examined and forwarded" is it signed by the responsible officer in person? (Cir. No. 8, W.D. 1-22-37.)

APPENDIX II

Ready reference for writing paragraph "N". (See pocket in back of book.)

CHAPTER 5

Aerial Photographs and the Combat Officer

It is axiomatic that the military features of the terrain are an important factor in an operation and that the commander who utilizes them the most skillfully will thereby attain an advantage. However, let us go further and say that "utilizing the terrain" involves recognizing and exploiting those terrain features favorable to ourselves and avoiding or minimizing those features favorable to the enemy or unfavorable to ourselves. On top of that let us make the presumption that all officers engage in numerous map problems, field exercises, and maneuvers which are designed to develop this ability, and that they thereby acquire great skill therein. This all appears fair enough and would seem to close the subject. But, does it? Let's dig into the subject a bit to see.

To be able to utilize terrain skillfully is a great asset. But what will the greatest skill avail a commander if and when his knowledge of the terrain is inadequate or inaccurate? History is overburdened with disasters caused by just this. A commander cannot evaluate and exploit the terrain until he knows its features. As a consequence, he must first learn the terrain, thoroughly and in detail. That means a diligent and careful study of all sources of terrain information.

One source of information regarding the terrain is the map. But these are not to be leaned on too heavily. They have their faults. New roads go in and old roads are relocated. Woods are cut down and formerly open land aban-

doned to grow up into brush and woods. The map may have shown these things accurately at the time of its survey, but where is the map that was surveyed yesterday?

Our other source of terrain information is the personal reconnaissance. However, the tendency today is toward broader fronts and greater depths. This, coupled with motorization and mechanization which permit faster and wider movements, indicates clearly that we must face the fact that a commander will have more terrain to know, and less time in which to learn it. Will he be able to attain this knowledge of the terrain from the sources just mentioned? The matter is vital, but, perhaps, we have allowed past experience to delude us as to our ability or facility in solving terrain problems.

In the past, we may have presumed a greater skill in using terrain on the part of officers than it is reasonable to expect; or, to put it another way, perhaps our officers have had a greater knowledge of the terrain over which they conduct their problems and maneuvers than would be the case in war. When organizations conduct their field training and maneuvers they are invariably operating on ground over which they, or a large portion of them, have operated in years past. The maneuver is a success. Why wouldn't it be when most of the personnel had been over the ground many times before and know it from past experience? And what would happen if the organization was operating over new terrain?

We, also, face somewhat the same situation in a map problem. The map shows a road net, certain woods and open ground, ridges and valleys. Anyone who can read a map can evaluate the features and make his dispositions accordingly. And since it fits the student's map, it will also fit the instructor's map. But, would it fit the ground? Probably not. Because no map is ever exactly like the ground. Time changes all maps. Therefore, it is necessary to supplement maps with a personal reconnaissance. But, as noted above, in modern war this will be a sizable job and often a sketchy one. As a consequence there is a problem

facing any commander if he expects to exploit terrain features to the maximum.

It is here that the aerial photograph takes its proper place. It gives to the commander an additional source of information regarding the terrain. The photograph will show the road net exactly as it is, and with all its detail. In the matter of woods the photograph is far superior to the finest map, in that it shows all the various classifications of woods: dense, high, sparse, second growth, and even brush. The photograph is in itself a map as it shows the ground features in their proper size, shape, and horizontal relation to each other. It is also a personal reconnaissance as it shows exactly what is there at the present moment, and shows things as they actually appear.

There are many ways that these photographs can be used by the combat officer. The following informal illustration indicates one way. Others will quickly suggest themselves.

Time: About 9:30 PM.
Place: CP, 3d Bn Nth Inf (in regimental reserve).
Cast: Assembled company commanders and the battalion staff, awaiting the return of Lieutenant Colonel "A" from a conference with the regimental commander.

Enter Lieutenant Colonel "A":

"Are we all here, gentlemen? Good.

"I will give you the general picture now. Details will come later. Get out your maps. (Figure 18.)

"We move up tonight and attack at daybreak. We jump off from Rivet Ridge and our objective is Davidson Hill. It's too late now to make a reconnaissance, but I have here an aerial photograph (Figure 19) that may be of some assistance. I'll go over it with you here, and you can make such notes as may be needed directly on your maps.

"First the matter of cover. I see that the map shows a continuous band of woods across our front from the 30th Infantry Woods to the 7th Infantry Woods, both inclusive. From the map it would appear that we have a wood mass

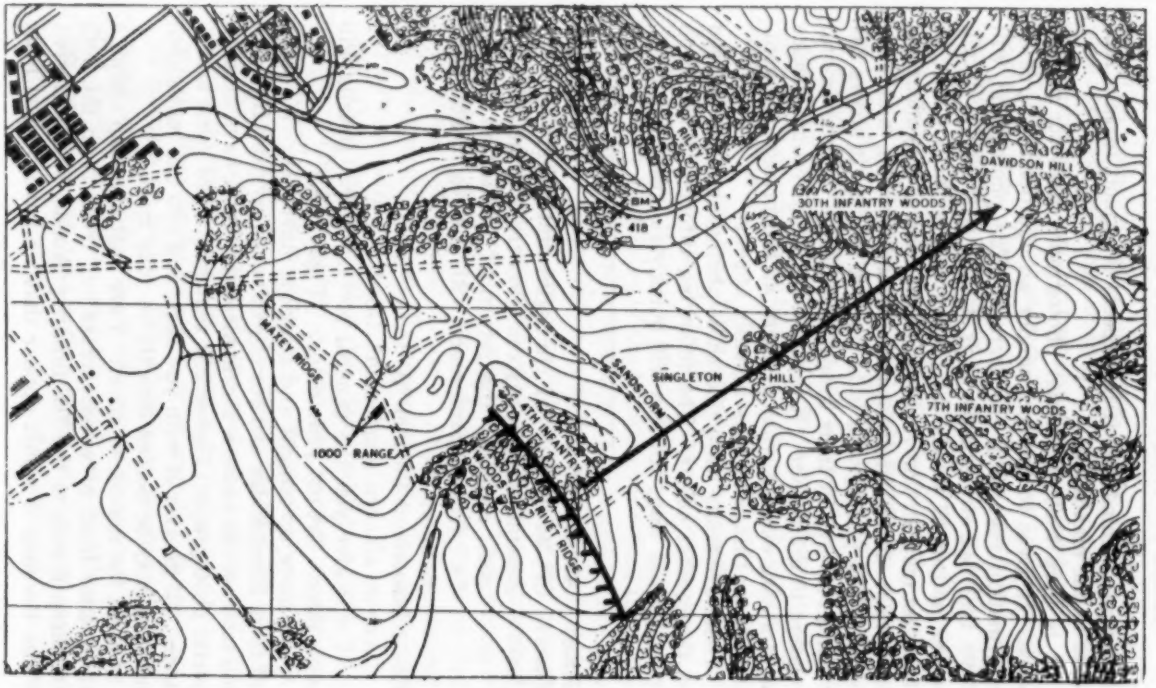

FIGURE 18.—Map.

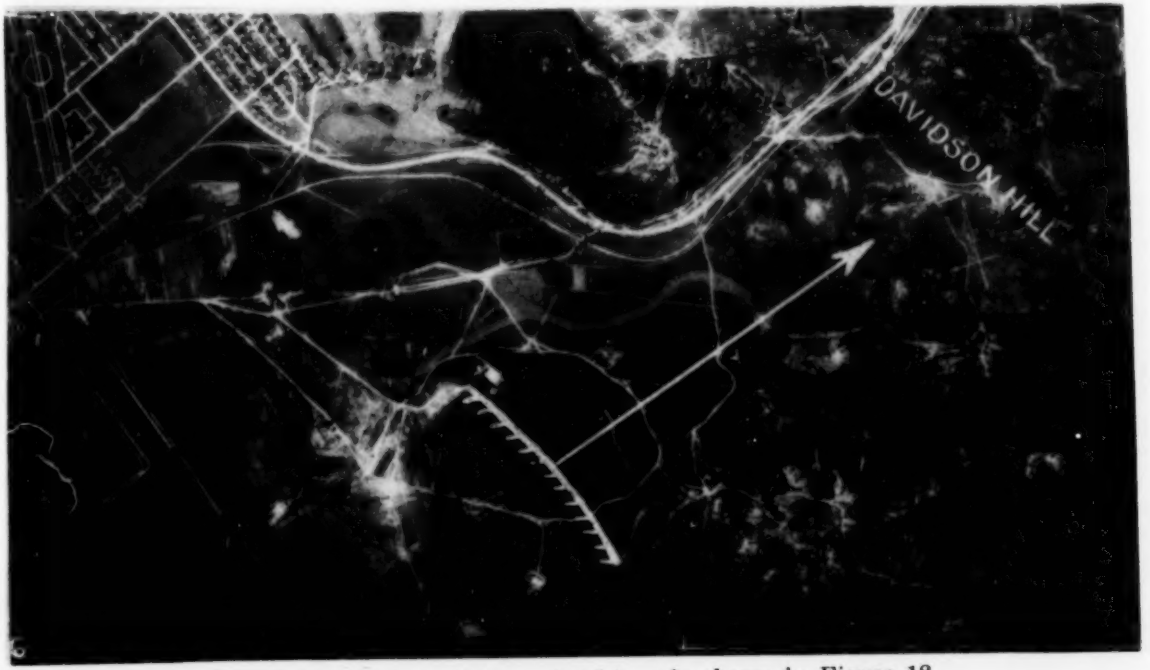

FIGURE 19.—Aerial photograph of terrain shown in Figure 18.

FIGURE 20.—Oblique photograph of zone of advance.

about 1,300 yards long and 700 yards deep, right in front of the enemy position. However, the photograph shows the map to be in error on this point. These woods have been cut away and all that remains of them is a small rectangular patch about 300 by 150 yards. It therefore appears that the enemy will have an excellent field of fire for small arms and machine-gun close-in defensive fires along the front of his position, and that there will be no cover for the final stages of our attack.

"Incidentally the photograph shows that the wooded area shown by the map on Davidson Hill has been greatly reduced, and only a small portion remains in the vicinity of the letters "DAV". Consequently our occupation and organization of the position after the assault will be exposed to enemy observation and fire.

"Now for the road net. The map is rather unconvincing regarding the roads on Singleton Hill. It leaves a few of them dangling in the air, for no good reason. The photograph shows the road from Rivet Ridge to cross the Sandstorm Road and to continue straight ahead and to hook up with the road (shown as a trail on the map) on Riley Ridge. The photograph, moreover, shows that this road does not begin on Rivet Ridge, as the map indicates, but swings back through the 1000″ RANGE and roughly parallels the Maxey Ridge road. Comparing the photograph with the map on this point it would seem that this road is on the reverse slope, and is a covered approach for transport right up to the line of departure, the only doubtful portion of it being masked by the 4th Infantry Woods.

"I have here, also, an oblique photograph which looks right up our zone of advance. (See Figure 20.) It confirms the other photograph regarding these details, and also gives a very good idea of the nature of the terrain. Take a look at this photograph before you leave.

"Are there any questions regarding the matters I have just discussed? Time will be available before the issue of the order for those who desire to examine the photographs closely.

"S-3, have you . . . ."

Unquestionably the aerial photograph will be available to the combat officer in the future. It will be up to the minute. It will show the road net and the vegetation in great detail. Moreover, it is not lacking in information regarding relief. It requires no special skill to read the photograph, as it shows familiar things exactly as they appear to the eye. The aerial photograph is a map and as such should be more widely used by combat officers.

Reverting to the illustrative situation cited above, it is not unreasonable to expect that the battalion commander might have been able to issue copies of the photographs to all his company commanders. Had this been the case they would have found no further need for their maps. For, in its final analysis, the whole purpose of the map or the photograph is to convey to the reader an accurate picture of the terrain. The map must do this by suggestion, through symbols, but the photograph does it by exact reproduction.

(EDITOR'S NOTE.—Allowance should be made for the type of paper on which these aerial photographs are printed. Despite the ordinary bond paper, the photographs give considerable valuable detail. With a more expensive calendared paper it is possible to reproduce a photograph by printing that loses little detail and is, therefore, still more valuable.)

CHAPTER 6

The Passage of The Tigris

(Historical Map Problem)

During the early years of the World War Britain encountered ill luck in her military adventure in Mesopotamia. All attempts at conquest ended in failure. True, the British government originally had no particular desire to become deeply involved there, but the Indian Army and the British low evaluation of their opponents' ability had led them in reckless fashion deep into the country. Then came a crushing blow—a whole British army, commanded by General Townshend, was captured when it strained its communications to the breaking point. Such a thing was unthinkable to old colonial fighters, yet—there it was.

As a result, the prestige of the Empire suffered severely, particularly in the East. The Mohammedan Turk had finally turned and won a great victory. A thrill went through the Moslem population of the Empire. This disaster and the retreat from Gallipoli definitely proved to Eastern peoples that Tommy Atkins was not unconquerable, as they had thought. He was human clay. There was an uneasiness in the East, rumbles and deep stirring among the people.

Now Britain could not let go; she must go forward.

So, in characteristic fashion, the British clung to what they had, and started again to invade the interior of Mesopotamia. However, this time they used more method. General Sir Stanley Maude was in command of the invading force. Slowly, methodically, he pushed his way up the Tigris-Euphrates valley. We may be sure that anxious eyes

MAILING LIST—8

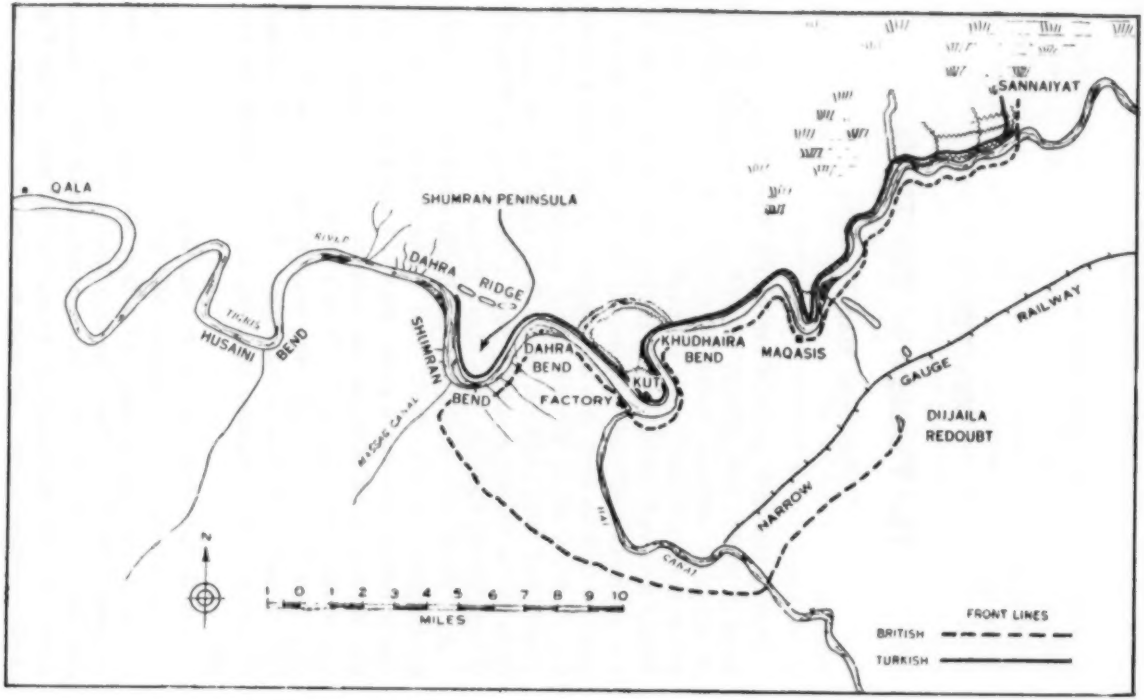

FIGURE 21.—General situation in February 1917.

were on Maude. He had a greater task than fighting an army. There was a huge, but invisible load on his shoulders. Another disaster, or even a serious reverse, and no one knew what would happen within the colonial empire.

In studying the problems that faced Maude and his subordinates one should always keep this background in mind. An historical problem is real, and we are dealing with live people, in a practical situation, where assumptions or an academic approach have no place. Let us therefore turn to the record and see what Maude is, and has been, doing.

During the month of February 1917, General Sir Stanley Maude's Mesopotamia Expeditionary Force was engaged with the Turks near the city of Kut where, in April 1916, the 6th Indian Division under General Townshend had been starved into surrender. General Maude's force had been fighting and advancing steadily for two months. Most of the Turks to his immediate front had been driven north of the Tigris and were now defending the north bank of that river. (See Figure 21.) General Maude knew that the recapture of Sannaiyat and Kut would help materially to restore the lost prestige of British arms in the East. This being so, it may be advisable at this time to check his resources, survey his position, and set forth the obstacles that face him.

On February 19, the British forces—total strength, approximately 46,000 to 48,000 rifles and sabers, and 174 guns —were disposed as follows:

The Indian I Corps (two divisions)* had its right north of the Tigris, at Sannaiyat. The corps front extended south across the Tigris, thence west along the south (right) bank as far as the Hai Canal.

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* The British divisions at that time consisted of three infantry brigades of three battalions each. While the amount of artillery in the division varied, it averaged about two brigades (battalions) of from 12 to 18 guns each and one mortar battery of four mortars.

The Indian III Corps (13th and 14th Divisions) occupied a position on the south bank of the Tigris extending from the Hai Canal (left of I Corps) to the Massag Canal, thence along the Massag Canal into the desert (See Figure 21). The 13th Division occupied the corps position; the 14th Division was concentrated in corps reserve and in bivouac along the left bank of the Hai Canal, about two miles south of the Tigris.

Advanced elements occupied positions as indicated in Figure 21 by the broker line.

Combat efficiency and material means (supply and equipment) of the British were excellent.

The Turkish situation as seen by the British was as follows:

The Turkish front line was as indicated in Figure 21 by the solid line.

The latest British information concerning the Turkish positions was as follows: The position at Sannaiyat was heavily entrenched and strongly held. The position in the Kut Peninsula was also heavily entrenched and strongly held. Troops held the river line. The position in the Shumran Peninsula was not so heavily entrenched. The river line was held by entrenched outguards with machine guns. Turkish supports occupied positions in rear of the river line but there were no communicating trenches connecting the supports with the river line. The reserves for the Shumran Peninsula were located at Dahra Barracks. (See Figure 22 in back of book.)

The British Army G-2, on 16 February, estimated the strength and location of the Turkish effectives as follows:

	Cavalry	*Infantry*	*Guns*
North bank of the Tigris			
Sannaiyat position	——	3,000	19
Sannaiyat to Kut Peninsula (both exclusive)	90	1,100	6
Kut and Shumran Peninsulas	100	4,500	60
West of Shumran Peninsula	——	400	4
South bank of Tigris			
West of Shumran Peninsula	310	1,300	2
Total present in this locality	500	10,300	91
In reserve and ready to move to the Tigris front (location not definitely given)		One division (about 5,000 men)	

British patrols sent west along the south bank of the Tigris on 17 and 18 February reported no enemy south of the Tigris.

During previous battles and skirmishes the Turkish infantry had given proof of its stubbornness on the defense. However, continuous fighting had somewhat weakened its combat efficiency. The Turkish artillery was not as skilled in gunnery as the British artillery, and the Turkish supply of ammunition appeared to be running low.

Both sides had aviation. However, the British antiaircraft artillery and combat aviation had made Turkish air observation almost impossible.

The terrain about Kut is a desert practically devoid of vegetation and, except for numerous shallow stream courses, almost as flat as a table top. There were no highways, or railroads; but, when the ground was dry, transportation of all kinds could move freely in any direction. But, at this time, any movement of vehicles was difficult, due to recent heavy rains. While the rains had ceased for the moment they could be expected to start again at any time, since the rainy season had begun.

There was no moon. Daylight was at 5:00 AM.

PLAN OF ARMY COMMANDER

The following is an extract from the estimate and plan of the British Army commander:

The hostile position at Sannaiyat, with its right flank resting on the Tigris and its left on the impassable marsh, was too narrow to permit the British to bring their superior strength to bear against the enemy without suffering undue losses. Since the Turkish line along the river had become somewhat extended, a penetration somewhere west of Sannaiyat offered better chances of success. A strong British force on the north bank in the vicinity of Dahra Barracks would threaten the enemy's right flank and rear and his principal line of communication which ran along the north bank to Qala and Baghdad on the upper Tigris.

Based upon his estimate of the situation, the army commander, on 19 February, decided to force a crossing of the Tigris somewhere west of Kut.

A river crossing in face of the enemy is an intricate and delicate operation. Yet here, it should be noted that the Army commander preferred this operation to battering away at the strong Sannaiyat position, although at Sannaiyat he was already across the river. Note, also, how his contemplated operation deftly thrust at the enemy communication. Maude was maneuvering and using none of the battering-ram characteristics so prevalent on the Western Front.

In general the plan of the Army commander to carry out this decision was as follows:

The III Corps would force a crossing of the Tigris somewhere between Kut (exclusive) and the Shumran Peninsula (inclusive) on the night of 22/23 February at an hour to be selected by the III Corps commander.

The I Corps would assault and capture on 22 February a portion of the Sannaiyat position and continue to act vigorously in that neighborhood in order to draw as many of the enemy as possible from the Kut and Shumran Peninsulas.

The I Corps would execute a raid across the Tigris near Maqasis on the evening preceding the crossing.

PLAN OF THE III CORPS COMMANDER

The following extracts from the plan of the III Corps commander indicate his plan for forcing the crossing:

The 14th Division would execute the crossing sometime after midnight 22/23 February.

Three battalions of the 37th Brigade (14th Division) would constitute the bridgehead troops. This force would cross by ferrying in the ponton boats.

The remainder of the division would cross by a bridge to be constructed on orders of the Commanding General 14th Division when the bridgehead troops had reached their objective.

The 13th Division would make a feint at crossing the river opposite Kut throughout the night of 22/23 February.

TECHNICAL DATA

1. The current of the Tigris was six miles per hour.

2. Thirteen pontons were available for each battalion of the bridgehead troops; total, 39 pontons.

3. Each ponton required a crew of four rowers and a coxswain. These had to stand up while operating the boat; consequently they were exposed to the fire of Turkish small arms.

4. Each battalion of the bridgehead troops averaged 800 men. Capacity of boats, exclusive of crew, ten men with arms and equipment.

5. In addition to the 39 pontons for ferrying, there was available a ponton train with sufficient pontons and equipment to build one bridge.

A reconnaissance of the south bank west of Kut disclosed the following (See Figure 22):

1. The Tigris varied in width from 200 yards at the narrowest point to about 700 yards at the widest point.

2. There were several shelving beaches and sand bars on the north bank.

3. The south bank, except along Dahra Bend and at point

a was vertical and would require ramping before heavy bridge pontons could be launched.

4. The north bank was from five to seven feet above the river and the south bank from three to five feet. Both banks rose slightly above the general level of the adjacent ground and formed a low parapet at the top of the river bank.

FIRST REQUIREMENT

Many things face the commander here. For the moment put yourself in his place. Remember that this is no synthetic problem but one that a soldier actually had to solve. Study the situation as outlined in conjunction with Figures 21 and 22 and make your own decision on the following:

1. What hour would you pick for initiating the ferrying operations of the bridgehead troops?
2. What points would you select for crossing each of the three battalions of the bridgehead troops?
3. At what position would you locate the bridge?
4. What number of men would you provide as crews of the pontons to be used in ferrying the bridgehead troops and how would you distribute them?
5. During the crossing, where would you expect the heaviest casualities to occur: among the troops of the leading wave, those of subsequent waves, or the members of the crews?

DISCUSSION OF FIRST REQUIREMENT

Before giving any decision on these matters it will be well to consider, pro and con, the various factors that enter into the decision. We will discuss the problem under two main headings: engineering features and tactical features. Then we will let the British general decide and later see whether he was right or whether our decision was better. If we are wrong we lose nothing more than a complacent feeling; he will lose hundreds of lives and perhaps the campaign. We have the softer job—let's jot down our decisions now.

As we read the discussion we can check to see if we have neglected or slurred any technical or tactical point in arriving at our decision.

ENGINEERING FEATURES

River conditions are unfavorable. The six-mile current will make it difficult to land pontons at selected points.

Although a night crossing facilitates concealment and secrecy, it increases the difficulty of maintaining direction with pontons, and adds to the probability of confusion in the operation. On the other hand, in daylight the effectiveness of the enemy's small-arms fire will be greatly increased. A particularly heavy toll can be expected among the oarsmen who of necessity must stand up while rowing. However, a decision as to a day or night crossing should be based on tactical considerations, and not on these technical difficulties.

Similarly, tactical considerations should govern in the selection of the ferrying points. If the pontons used for ferrying were to be used later in the bridge, it would seem desirable to build the bridge downstream from the ferrying points. In this situation, however, the ferry pontons are not needed for the bridge, so the ferrying points and bridge site can be chosen independently.

The unloading of ferries on the north bank must be completed quickly to avoid casualties. This cannot be done if there is no beach. Therefore, embarkation points on the south bank are so chosen as to secure suitable landing beaches on the north bank, with due allowance made for drift. Obviously, the amount of drift depends on the current and the skill of the oarsmen. Practice for the oarsmen and rehearsals for the troops who are to be ferried will expedite the crossing.

We may expect a drift of at least 700 yards.

Since cross-country movement is possible in this situation, the road net need not be considered in selecting the bridge site. Furthermore, reconnaissance shows that there is but little difference between the various points on the south bank. There is not sufficient water in the ravine tributaries adjacent to the bridge site to float pontons. Launching ramps will have to be constructed wherever the bridge is built. The width of the stream is important in the selection of a site. The wider portions of the stream mean a longer

bridge but a slower current to fight. In the narrower portions of the river the opposite conditions obtain. Any point chosen should be a compromise between the two.

The closest estimate which can be made of the time required to lay the bridge is from 8 to 12 hours, depending upon the amount of interference by the enemy.

Each ponton will have to make at least six round trips. If three reliefs are used, each crew will have to make two round trips. Three reliefs will require 585 oarsmen. Each round trip will take about 30 minutes, during which time the oarsmen standing in the ponton will be under fire. Provision for 50 percent replacements in oarsmen, as advocated in American teachings, will be none too high for a daylight crossing. Nine hundred oarsmen is a sound number upon which to work.

Since the crews must make at least two round trips each, and since the oarsmen must work standing, the heaviest casualties may be expected among the crews.

DISCUSSION OF TACTICAL FEATURES

The selection of the hour for initiating the ferrying of the bridgehead troops is an important one. In this situation there are factors favoring both a crossing under cover of darkness and a daylight crossing.

A night crossing favors secrecy and surprise; there is always the possibility of landing undiscovered on the hostile shore. A night crossing also reduces the effectiveness of the hostile fire on the troops while they are in the boats and unable to return that fire. On the other hand, the effectiveness of friendly supporting fires is likewise materially lessened. Night operations are always difficult, and, in this situation, the swift current and inexperienced crews add to the natural difficulties. Combat on the defender's side of the river during darkness favors the defender on account of his superior knowledge of the terrain.

A daylight crossing permits better fire support. In this situation, several factors indicated the desirability of such support. It was known that the enemy held the river line

with entrenched outguards with machine guns. Supporting troops occupied entrenched positions farther back and there was a large reserve at Dahra Barracks. Well directed supporting fires could immobilize these supports and reserves, owing to the flat, open country over which they had to move.

In reaching his decision as to the hour of crossing the corps commander had to consider the following questions:

Could the overwhelming strength of the British artillery neutralize the Turkish fires?

Were the Turkish weapons along the river bank sufficient to inflict heavy losses on troops crossing under cover of darkness?

Were the opportunities for obtaining surprise during darkness great enough to discount some of the obvious disadvantages of a night crossing?

Considered from the viewpoint of a map problem, the selection of the hour of crossing seems purely a matter of opinion. Either a day or night crossing may be justified by our doctrines. But here one might digress and add, that no doctrine ever justified a failure. With an actual situation, not a map problem, the decision is reached by close study of all the factors involved and not by the weighing of doctrines. An officer is a man of action, not a doctrinaire.

The army commander, for good reasons, directed the corps commander to force the crossing somewhere between Kut (exclusive) and Shumran Peninsula (inclusive). The corps commander's problem, therefore, was to select suitable crossing sites somewhere within the limits given.

There are two general areas in which a crossing should be considered (See Figure 22): (1) The Shumran Bend between points *a* and *k*; (2) the Dahra Bend between point *k* and point *r* near the mouth of the Hai Canal. From a tactical standpoint the Shumran Bend affords an excellent opportunity to enfilade the hostile position from two flanks. Furthermore, any fires that the enemy in this locality direct against the British rear areas on the south bank will be relatively ineffective. In the Dahra Bend, however, these conditions will be reversed for here the defenders will have

not only the advantages of enfilade and converging fire but the additional advantage of being able to engage their reserves more quickly than the British.

Since the technical difficulties involved in the crossing are, in general, identical along the whole front, it appears that the Shumran Bend is the better area in which to make the attempt.

From an examination of this area it appears that the problems of communication and control can be considerably simplified if the crossings are made between points *c* and *j* and if the maximum distance between battalions is limited to 1,000 yards. On the other hand, if the crossing points are separated by greater intervals there will be more room for maneuver and a better chance of finding a weakly-held section of the river line.

As previously pointed out, the exact embarkation points should be chosen with a view to securing suitable landing sites on the north bank. In this situation, a point near the apex of the peninsula that is desirable for ferrying operations is also desirable as a location for the bridge. However, bridging and ferrying operations should always be separated by a distance sufficient to prevent artillery fire directed at one from striking the other. Hence, in selecting ferrying points, a suitable point should be left for the bridge.

A map study indicates that crossing points at *e*, *g*, and *i* would give the broad front desirable for river crossings.

The bridge should be constructed where it can be well protected. The Shumran Bend re-entrant best meets this requirement. A site in this bend somewhere between *f* and *g* appears to be the best location. Since the technical details of the problem need not be considered, the bridge site should be selected with the view of securing the best cover from hostile observation. Although little can be done on the ground to prevent enemy air observers from locating the bridge, it is, nevertheless, a good idea to select a point removed from any conspicuous landmark. From the viewpoint of ground observation it is better to build the bridge at some point where the rim along the north bank of the river is high and unbroken. If such a point can be found, the con-

struction of the bridge will be free from the observation of all hostile ground troops except those actually on the river line. As a result, the effectiveness of the enemy's fire will be reduced. Of course, the exact position of the bridge will have to be decided on the ground. All that can be determined from the map is that it should be built somewhere in the vicinity of points *f* and *g*.

HISTORICAL SOLUTION OF FIRST REQUIREMENT

1. Ferrying operations were to be initiated at dawn 23 February as soon as it was light enough to see.

2. The points selected for the crossing of the three battalions of the bridgehead troops were:

Ferry No. 1 at *g*.
Ferry No. 2 at *i*.
Ferry No. 3 at *j*.

3. A point between *f* and *g* was selected for the bridge site. The width of the river at this point was calculated to be 340 yards.

4. The boat crews were distributed as follows:

Ferry No. 1	275 men
Ferry No. 2	230 men
Ferry No. 3	230 men
Total	735 men

The crews were made up of volunteers. One hundred men volunteered for this work from the battalion which was to cross at Ferry No. 1. The remainder came from a battalion of another brigade and from various engineer units.

Each ponton was provided with three complete crews who were to work in reliefs. This required 585 men. The remaining 150 were held in reserve.

5. The heaviest casualties were expected among the crews.

DISCUSSION OF HISTORICAL SOLUTION

The first decision of the corps commander was that the bridgehead troops would be ferried across the river under

cover of darkness. However, the Commanding General 14th Division, on learning of the decision of the corps commander to cross under cover of darkness, stated that owing to the swiftness of the current and the lack of experience of his men in rowing the pontons, it would be difficult to cross quickly and reach the prearranged line. He also believed that he would obtain better fire support if the crossing did not begin until daylight. After daylight the machine guns, mortars, and artillery would have observation over the open terrain and could support the bridgehead troops more closely. The Commanding General 14th Division based this latter belief upon the fact that the Turks had no communicating trenches and that any Turkish reinforcements moving toward the river would be under observation from the south bank.

It appears from the accounts of this operation that the commander of the 14th Division was an able and experienced soldier in whom his superiors had confidence. The Official History states, "This selection (the 14th Division) was taken by the force generally as a favorable omen for the success of the enterprise, owing to the reputation that General Egerton (the division commander), his staff, his officers, and his men had gained in the recent operations."

The time of the crossing of the bridgehead troops, in common with its composition, are matters to be decided by higher authority. However, it is essential that the fullest cooperation exist between the higer commanders and their subordinates. Therefore, those subordinate commanders who are ordered to perform a particularly difficult task should be allowed to express their views prior to the high command's final decision.

In planning to cross the bridgehead troops under cover of darkness, the corps commander probably believed that a night crossing would result in fewer casualities and would stand a better chance of taking the enemy by surprise than a daylight effort. As just indicated, the division commander favored a daylight crossing. Obviously, advantages accrue to a daylight crossing. But do they outweigh the attendant disadvantages? Therein lies the question.

The corps commander as well as the rank and file of the 14th Division had confidence in the division commander. Therefore, if the corps commander believed that his subordinate's plan was sound and in harmony with the general plan, he was thoroughly justified in permitting the 14th Division to use its own method in performing its mission. Such procedure makes for increased initiative on the part of subordinates. On the other hand, regardless of the plan adopted, the responsibility lies with the corps commander.

We have seen that the corps commander accepted the recommendations of the division commander. The decision was a close one and, at best, a matter of opinion. Let us withhold judgment as to who was right until we have made further studies of the entire operation.

The British Official History states that it was desired to have all ferrying done below the bridge site, since ponton boats drifting down the river out of control would greatly hamper bridge construction. Subsequent events proved this insufficient grounds for not selecting crossing points above the bridge site. Heavy logs launched upstream from the bridge by the Turks in an effort to hamper the British had no serious effect on the construction of the bridge.

A study of all available data at the time clearly indicated that a point somewhere between *f* and *g* was entirely satisfactory for a bridge position. The width of the river (calculated to be 340 yards) favored it. In addition, one point along the river bank was as easily accessible as another. Moreover, the apex of the peninsula was the most favorable locality for protection against the fire of hostile weapons.

Since the crews had to stand up to operate the boats, they were exposed to the small arms fire of the Turkish outguards along the river bank. Heavy casualties were bound to occur. Therefore, many replacements would be necessary. Since the members of the crews were more exposed, and for longer periods, than the passengers, the British naturally expected the heaviest casualties among the crews. Their expectations proved to be well founded. Actually the British estimate of replacement needs fell short and more men had to be secured.

SITUATION, CONTINUED

The plan of the corps commander provided for a feint at crossing the Tigris near the factory opposite Kut on the night preceding the actual operation. This task was assigned to the brigade which held the river line opposite Kut. No pontons were available for the demonstration. Furthermore, the corps commander directed that every possible precaution be taken to avoid casualties.

As S-3 of this brigade you are directed to submit for the approval of the brigade commander a plan for carrying out this mission.

SECOND REQUIREMENT

Submit the plan of S-3 for the execution of the brigade's mission.

DISCUSSION AND HISTORICAL SOLUTION

S-3's problem is one of deception. He must make the enemy believe that preparations are being carried out for a crossing the next morning. To do this he must provide for the simulation of the sounds of heavily loaded wagons hauling up bridging material, of unloading these wagons, of carrying the loads to the water's edge, of preparing approaches, of troops moving in the vicinity, and of supporting weapons being emplaced. Since no pontons are available, they too must be simulated. To meet the restriction that casualties be kept to a minimum, the number of men to do the work must be few. Finally, the false activities must not be overdone, or the enemy will recognize the feint for exactly what it is.

HISTORICAL SOLUTION

In the historical solution the brigade opposite Kut undertook to give the impression that a bridge was being constructed at the factory. During the night, wagons and timbers were moved about in rear of the factory. A few men with boards or paddles splashed about in the river. Several artillery observation towers (ladders) were erected in rear of the British line. These were intended to give the impression at dawn that a bombardment was imminent. All natural precautions, such as the absence of lights, were observed. However, the noises incident to such operations were a bit exaggerated in order to make sure that they would be heard across the river.

SITUATION, CONTINUED

ATTACK OF I CORPS

The I Corps, which in accordance with the Army Commander's plan was to make a feint in order to draw troops from the III Corps front, began its task. At 3:15 PM, 22 February, one division of the corps launched an attack upon the Sannaiyat position north of the Tigris. The attack was successful and the enemy's first and second lines were carried. The Turks counterattacked several times but failed to dislodge the British. The Turks launched seven counterattacks, according to the British army commander's report of the operation, and suffered heavily.

The raid which the I Corps was ordered to make at Maqasis was successful. The three officers and 93 Indian enlisted men who were ferried across the Tigris, cleared a section of the enemy front line, captured a trench mortar and recrossed the Tigris, with only slight losses. The Turks were seen signalling to their own forces in rear that the British had crossed the Tigris.

ATTACK OF III CORPS

The III Corps, it will be remembered, was to attack the night following these feints, making its main effort with the 14th Division. The objective or line to be taken by the

bridgehead troops of the corps extended from point *16* to point *7* (Figure 22).

To cover the crossing the following supporting fires were ordered:

1. *Artillery.*—During the night preceding the crossing, 26 guns of the 14th Division were placed in position on the line: point 500 yards west of point *e* to point 600 yards northwest of point *d*. The artillery was protected by an infantry brigade of the 13th Division which, during the night, moved into position on the east, north, and west of the guns.

Forty-two guns of the 13th Division were placed in position opposite the eastern and southern faces of Shumran Bend from Dahra Bend to Massag Canal.

2. *Trench mortars.*—Ten trench mortars of the 13th Division were placed in prepared positions on the river bank between points *k*, *i*, *h*, *g*, and *f*. They were ordered not to fire unless the enemy opened a heavy rifle and machine-gun fire on the crossing, then they were to pay particular attention to enemy machine guns.

3. *Machine guns.*—Forty-five machine guns from the 13th Division were placed in 10 prepared emplacements near the river bank from point *m* to point *c*.

The 37th Brigade (14th Division) was designated to make the initial crossing and form the bridgehead. The brigade commander, Brigadier General O. W. Carey, planned to use his troops as follows:

Ferry No. 1	2d Norfolk Battalion
Ferry No. 2	2d Battalion, 9th Gurkas
Ferry No. 3	1st Battalion, 2d Gurkas
Reserve	67th Punjabis

Prior to the date of the crossing attempt, night practice had been conducted in the Hai Canal in unloading, carrying,

launching, and rowing the pontons. At the same time, the troops who were to be ferried across the river were rehearsed in embarking and debarking from the pontons.

The preparations were complete and the troops began to move. Here we should stop a moment and referring back check again the British plan for the actual crossing. Will the daylight crossing succeed? Was the plan correct? The answer will come in a short time. Let us take up the narrative and see what happened.

Soon after sunset, 22 February, the three battalions of the bridgehead troops left their bivouacs and marched to the vicinity of their respective ferrying points. The pontons were unloaded some distance from the river and then quietly carried forward to positions near the points where they were to be launched. This was completed at about 1:00 AM, and the troops lay down to rest. The night was dark and, except for a little machine-gun fire directed for a short time against the battalion at Ferry No. 3, the enemy gave no indication that he had noticed anything unusual.

The 67th Punjabis moved up during the night and went into bivouac about one-half mile southeast of point *g*. It constituted the reserve of the brigade.

The bridge train, which was to construct the bridge between points *f* and *g* after the bridgehead troops had reached their objective, followed the reserve battalion and parked for the night about 1,500 yards south of the river bank. The personnel of the bridging detail proceeded to the bank and completed their preliminary work before daylight.

THE CROSSING

Silently at 5:15 AM the pontons were slipped into the water. By 5:30 AM, at which time the opposite bank could

just be discerned, all pontons were afloat. Within the next 10 or 15 minutes the first loads started to cross at each of the three ferrying points.

At Ferry No. 1 at *g* the 2d Norfolks started the crossing. Tne Turkish sentries opened fire soon after the crossing began (5:40 to 5:45 AM) but, probably because of the dim light, only a few casualties were sustained. Second Lieutenant Hornor, the first man ashore, captured an enemy machine gun singlehanded just as it was about to open fire. The leading wave disembarked successfully, then cleared and occupied the river bank for about 500 yards to the right. As more men were ferried over, the line was gradually extended to the left and pushed forward. By 7:00 AM two companies were over, by 8:00 AM three companies. As the light grew stronger the British supporting weapons on the south bank had gradually gained the ascendancy and the Turkish fire diminished. The battalion's casualties were trifling.

The 2d Battalion 9th Gurkas, which attempted the crosing by Ferry No. 2 at *i*, met much heavier resistance. The first boats came under heavy small arms fire while still in midstream. Only 10 pontons reached the north bank and of these only six made the return passage. The remaining pontons, their crews casualties, drifted downstream out of control. Only five pontons made the second trip to the north bank. Casulties among crews were so heavy on this second trip that no pontons were able to make the return passage.

Only one and a half companies, less the casualties suffered en route, were across by 7:00 AM.

At 8:00 AM, three pontons were retrieved from downstream. These were loaded with fresh crews to man the disabled pontons on the north bank, a few reinforcements, and an artillery observation detail. These three boats managed to make the crossing.

The battalion commander, who had crossed in the first boat, took personal direction of the successive boatloads as they arrived. After severe hand-to-hand fighting he managed to work his units forward to a Turkish trench about 150 yards inland. Communication was then established with the battalion on the right.

The 1st Battalion 2d Gurkas manned the 13 pontons assigned to make the crossing at Ferry No. 3 at *j*. The boats were nearing the north bank, when the enemy discovered them and opened heavy rifle and machine-gun fire. All 13 pontons succeeded in reaching the bank but, owing to the unexpected speed made by the oarsmen, the boats landed about 400 yards farther upstream than had been expected. The leading wave found itself facing a 15-foot embankment. A hand-to-hand fight ensued before a footing was finally secured.

The casualties among the crews were so high that only two pontons were able to return to the south bank. These two pontons, together with two more which had drifted down from Ferry No. 2, were given fresh crews and re-

loaded. They began another crossing. Of these four pontons, but one reached the north bank. It contained only one unwounded man. Thus, soon after 7:00 AM, the battalion at Ferry No. 3 had 12 pontons stranded on the north bank and 3 lost in the stream. Several attempts were made to retrieve the stranded pontons but without success.

There is no record of how many men of the 130 infantrymen who attempted the first crossing reached the north bank safely. It is known, however, that by the middle of the morning the number of effectives on the north bank was about 60. These, thanks to the effective fire support from the south bank, were able to maintain their position in the face of several Turkish counterattacks.

At 7:30 AM the Commanding General 14th Division ordered the bridge construction to be begun at once. The officer in charge did not expect to have the bridge open to traffic before 4:00 PM.

At 8:30 AM the Brigade Commander 37th Brigade is in touch with his three battalions attempting to cross at Ferries No. 1, No. 2 and No. 3, and is familiar with the situation which exists at the time.

THIRD REQUIREMENT

Decisions and orders, if any, of Commanding General 37th Brigade at 8:30 AM.

SOLUTION OF THIRD REQUIREMENT

1. *Decision.*—At 8:30 AM, 23 February, the Commanding General 37th Brigade, decided to suspend, at once, the crossing operations at Ferry No. 2 and Ferry No. 3, and to make immediate arrangements for more units to cross at Ferry No. 1 in order to take advantage of the favorable crossing condition at that point.

2. *Orders.*—The following orders should be issued:

To the officer in charge at Ferry No. 2—"Cease attempts to cross at Ferry No. 2. The remaining troops at Ferry No. 2 will cross at Ferry No. 1, beginning at 8:45 AM. Send at least one company to Ferry No. 1 at once. Brigade will give this company orders for crossing. Details later as to further activity at Ferry No. 2."

To the officer in charge at Ferry No. 3—"Cease attempts to cross at Ferry No. 3. Continue to support your men on north bank. Further details later."

At this time it may be well to discuss the basic reasons which led to the above decisions.

The battalion at Ferry No. 1 will probably complete its crossing by 8:45 AM. One of the reasons for attempting to cross the Tigris at three different points was to increase the chance of finding a break in the enemy's river line defenses. Matters have now progressed far enough to gauge the results that can be expected from further operations at these three points. At Ferry No. 1 progress is being made. At Ferry No. 2 and Ferry No. 3 the operations are virtually at a standstill. Any further effort to cross at these points

offers nothing but the prospect of fresh casualties without commensurate return.

It is imperative that the brigade commander act promptly if he is to avoid further losses at Ferry No. 2 and Ferry No. 3, and at the same time utilize Ferry No. 1 to capacity.

An alternative which seems equally good, is to have the reserve battalion, instead of the battalion at Ferry No. 2, move up and prepare to cross at Ferry No. 1.

The timing of this requirement at 8:30 AM *is not intended to indicate that 8:30 AM is the earliest hour at which this decision can be made.* On the contrary, it seems that with good liaison and communication facilities this decision should have been made earlier.

The British Official History states: "It had become evident that further ferrying at No. 2 Ferry in face of the hostile fire was scarcely possible, and it was proposed at about 8:30 AM to send the remainder of the 2/9 Gurkas (the battalion at No. 2 Ferry) to cross at No. 1 Ferry, and this was agreed to."

SITUATION, CONTINUED

At 8:30 AM the brigade commander knows that three companies of the Norfolk battalion at Ferry No. 1 have crossed the river and that the fourth and remaining company is in the process of crossing. He also knows that the right of this battalion on the north bank has driven forward about 300 yards north of the landing, and that from this point the line extends to the west about 200 yards, thence southwest almost to the river bank. Finally, he knows that a small Turkish outguard is still in position on the river bank near the left of the British line.

FOURTH REQUIREMENT

The plan of the Commanding General 37th Brigade at *8:30 AM* to carry out his decision to cease further attempts to cross at Ferry No. 2 and Ferry No. 3 and to cross his three battalions of the bridgehead troops at Ferry No. 1. So much of this plan as is usually contained in paragraphs 3 and 5 of a formal field order should be given.

HISTORICAL SOLUTION OF FOURTH REQUIREMENT

The 2d Battalion 9th Gurkas at Ferry No. 2 was ordered to move to Ferry No. 1 immediately, leaving only a small detachment at Ferry No. 2 to maintain communication with the party on the north bank. The battalion was directed to begin crossing at Ferry No. 1 at about 9:30 AM. Upon gaining the north bank it would take over the ferry head and, as more troops arrived, would prolong the line to the right.

The weapons supporting the crossing at Ferry No. 2 would remain in position and continue to support the party on the north bank.

The 1st Battalion 2d Gurkas at Ferry No. 3 was ordered to move to Ferry No. 1 by 10:00 AM, prepared to cross the river on brigade orders. It would leave a detachment on the south bank to maintain liaison with the party on the north bank.

All supporting weapons would continue to support the attack from present positions.

All reserve ponton crews and remaining pontons were directed to move to Ferry No. 1 at once. Additional crews from the 13th Division were requested.

An advanced brigade command post was ordered established on the north bank by 10:00 AM.

DISCUSSION OF FOURTH REQUIREMENT

This requirement involves a number of questions. For instance:

1. When should the troops from Ferry No. 3 reach Ferry No. 1?

2. Where shall the battalions from Ferry No. 2 and Ferry No. 3 enter the action on crossing the river?

3. What should be done about the men now clinging to the north bank at Ferry No. 2 and Ferry No. 3?

4. What changes, if any, should be made in the supporting fires?

These questions might be answered as follows:

1. About two and one-half companies of the 2d Battalion 9th Gurkas are to cross at Ferry No. 1. At the present rate (45 minutes per company) it will be at least 10:30 AM before the ferry is clear for the 1st Battalion 2d Gurkas from Ferry No. 3. To be on the safe side and allow for any unexpected speeding-up, this battalion should reach Ferry No. 1 by 10:00 AM.

2. It is advisable to have the battalions at Ferries Nos. 1 and 2 take over the fronts originally planned for them because they have studied this terrain and must have made plans accordingly. Furthermore, they will be in a position to join those portions of their units already across at Ferries No. 2 and No. 3. Hence, the 2d Battalion 9th Gurkas will enter the line on the right of the Norfolk battalion and the 1st Battalion 2d Gurkas will enter the line on the right of the 2d Battalion 9th Gurkas.

3. The men clinging to the north bank at Ferries No. 2 and No. 3 must not be abandoned. Details should be left behind on the south bank to keep in communication with them. The men on the north bank should be urged to advance, if possible, and, in any event, to hold on. Close liaison with these detachments will enable the supporting weapons on the south bank to lend greater assistance. It is advisable to adopt every practicable means to make the enemy believe that further attempts will be made at Ferry No. 2 and Ferry No. 3.

4. The supporting weapons need not be moved just because the attempted crossings at Ferry No. 2 and Ferry No. 3 have been abandoned. In fact, the original positions, if properly selected, should permit these weapons to shift their fires to any desired locality in the peninsula. These supporting weapons now have a double mission: (1) To support the detachments on the north bank at Ferry No. 2 and Ferry No. 3; (2) to assist the advance of the 2d and 3d Battalions as they move into position from Ferry No. 1.

SITUATION, CONTINUED

By 2:00 PM all three battalions of the bridgehead troops were across the Tigris. The reserve battalion of the 37th Brigade began to cross at 2:10 PM.

The advance continued and by 2:00 PM the detachments on the north bank at the two abandoned ferries were reinforced by their own units by way of Ferry No. 1. The excellent artillery and machine-gun support from the south bank not only broke up two strong Turkish counterattacks but enabled the three British battalions to advance to the objective of the covering force. By 3:00 PM the three battalions were established on the line: point *16*—point *7*.

At about 7:30 AM the Commanding General 14th Division, who was familiar with the situation at each of the three ferries, ordered the bridge train to begin the construction of the bridge. This order was issued before the crossing of the bridgehead troops was definitely assured. The reason stated for this action was that moral support had to be given to the bridgehead troops.

In spite of the continuous fire of Turkish artillery, the bridging material was forwarded and the work progressed steadily. Since the current was too swift for the pontons to be rowed, two large motor boats were brought up. The hostile artillery fire was ineffective owing to inadequate observation. British aviation charged with the specific mission of preventing enemy aviators from locating the bridge, kept Turkish planes from assisting their artillery.

The Turkish artillery continued to shell Shumran Bend

throughout the day but did no material damage. The Turks also attempted to destroy the bridge by throwing heavy timbers in the Tigris but the engineers promptly countered by stretching a cable across the stream above the bridge. This was intended to catch the timbers and any floating mines. Naval parties were also on hand to assist, if necessary.

At 4:30 PM the bridge was ready for traffic. It was 295 yards long and its construction in about nine hours under such difficult conditions was considered a good performance.

The 36th and 35th Brigades of the 14th Division crossed the bridge during the evening. The following morning, 24 February, the British continued their advance and by 7:20 AM had captured the Dahra Ridge. The Turks were now in retreat, having decided the night before to retire to the west. Their rear guards fought stubbornly and enabled them to escape.

The 350 casualties suffered by the British 14th Division in effecting the passage of the Tigris were not excessive. Two hundred of these occurred among the ponton crews.

Although the enemy's losses are unknown, he must have suffered heavily as indicated by the fact that the British captured 540 prisoners and 5 machine guns in the Shumran Bend area alone.

CONCLUSION

The passage of the Tigris on 23 February, 1917, is usually considered a daylight crossing. As we have seen, all preparations were made at night. However, the first wave of pontons began the crossing while the light was still dim and before the Turks could see the south bank. In fact, the leading wave of the bridgehead troops operated with some of the advantages of a night crossing. Shortly after the first wave crossed there was enough light to permit observation by the supporting weapons on the south bank. Thus, we see that the time decided upon afforded some of the advantages of both a night and a daylight crossing.

The British had a decided superiority in supporting weapons. Without this preponderance it is not likely that they would have attempted to cross the bridgehead troops as late as they did. On the other hand, there is no assurance that the crews could have made the crossing as efficiently in the dark. The Tigris with its great width and swift current was a serious obstacle.

All in all the crossing was a success. It has been intimated in some critical studies of this operation that the adoption of the division commander's recommendation of a daylight operation made the operation more costly. This is a matter of opinion.

It took approximately ten hours after the crossing was initiated before the bridgehead troops reached their bridgehead position. This elapsed time appears excessive. The fact that the crossing was executed during daylight may have had some influence on the forward movement of the bridgehead troops. However, it now appears that the Turks did not have sufficient reserves near the points of crossing to seriously affect the operation of the bridgehead troops during this ten-hour period. We know today that the Turks were deceived by the attack at Sannaiyat, the demonstration opposite Kut, and the raid at Maqasis.

Although the delay in establishing a bridgehead was not vital in this particular situation, in most cases it would be fatal. For this reason the plan for a river crossing must provide for a rapid advance and the prompt capture of the bridgehead position. This will usually be a decisive factor.

The forcing of the Tigris at Shumran Bend graphically illustrates two things: first, the vast amount of preparation which has to be made before attempting to make a river crossing; second, the meticulous execution of each detail of the plan which is necessary in order to achieve success.

Finally, it should be understood that, although river crossings are usually made under the cover of darkness, they can be made in daylight and without excessive losses as this operation indicates.

But, at this place, do not let us go too far and conclude that a daylight operation is always possible. Any and all

operations should be scrutinized carefully and decided upon only after precise weighing of local details. The fact that once the Tigris was crossed in the half light of dawn is no reason for concluding we can cross a river in a future war during daylight if it suits our convenience. Too often past performances are translated into roles of action which, when applied to the present, lead to disaster. We should avoid that and consider every tactical plan as a creative piece of work based on local details and not on historical analogy.

CHAPTER 7

Modern Mobility Depends on Motor Maintenance

(INFANTRY SCHOOL STUDY)

The constant trend in the modern world is toward greater and greater speed.

Report of Chief of Staff, United States Army, 1935.

Of all things, nothing is surer than that modern life is characterized by tremendous speed—speed in everything but particularly in the means of transportation. Concurrently with this speed of civilian affairs we should expect a speeding up of military operations, for an army is basically an organization moulded and fitted to apply the inventions of peace to the purpose of war. Peoples who have forgotten, or failed to recognize, this basic truth have suffered disastrous defeats or disappeared from the face of the earth.

Therefore, at present all nations are making desperate efforts to reorganize their armies to fit into the high tempo of modern times. From a German warning we get the following: "We live in an era of speed. And we must introduce speed into every phase of military activity, design, production, training, planning, and movement. If infantry is to continue to exist in this era of speed, it must assimilate some of the rapidity that surrounds it." That statement covers it all.

But the task in the field of transportation alone is a staggering one. Things have come too fast to be understood, let alone assimilated. As an example, in 1895 there were but

4 motor vehicle registrations in the whole United States; today we have 28,221,291. What that means in military terms is only now being fully recognized. True, tacticians see the possibility of getting troops rapidly by means of motors to the critical point or points. "Get thar fustest with the mostest men," as Forrest expressed his theory of war, is just as feasible with motors as with horses. But just *how* to do this is not so easily discerned. We have handled horse soldiers for some thousands of years. How to handle motor soldiers is still a mystery. Why shouldn't it be? We have only had motors for some forty years.

Let the tacticians work out the proper means of handling motors and motor troops—they are making a good start on it—but no matter what their findings, or what their methods one thing will always face the soldier; that is *motor maintenance.*

This matter is vital. Already the War Department operates 11,621 trucks, 958 passenger cars, 301 ambulances and 899 motorcycles. It is a tremendous fleet of motors—one of the greatest in the world—and the future will likely see it grow. Its maintenance even in peace is a major problem. In war it becomes one of the greatest of all problems.

We can take it that good maintenance means few road failures. But some may always be expected. Yet General *A* in moving his division by motors has seldom a mechanical failure or tie-up, and his serials always arrive on time. But suppose we have an actuality, not a map problem, and suppose further that motor maintenance is poor. Then what will be the result? Let us analyze and see: From the Reference Data, Command and General Staff School, 1936, we find that it takes 782 one and one-half ton trucks to move the foot troops of a division with packs and individual equipment. Let ten percent of these vehicles fail to arrive at their destination on time, owing to mechanical breakdowns—great or small—and we lose 78 vehicles. In tactical terms this means 1,170 soldiers or roughly one and one-half battalions; or in terms of small arms ammunition, one and one-half days of fire for a division. That is serious. No general can neglect such a vital tactical factor. Right

here motor maintenance becomes not an *administrative* but a *tactical* matter. This is an infantry problem not a simple supply or service department problem. The quicker we grasp this significance the sooner we will learn to handle troops of the motor age.

Yet the ten percent mechanical failures, mentioned above, is not considered excessive. This was exceeded at times by the Italians in the recent Ethiopian campaign. The figure will increase as the motor maintenance factor is neglected, ignored, or slurred. It can go much higher; but how low can we expect to reduce it? It is hard to be definite here, but at the very least our objective in motor maintenance should be to equal, or better the record of one of our most efficient bus companies. This company maintains only a three percent reserve of spare vehicles which it finds ample as replacement for vehicles undergoing maintenance. It is true that war will produce considerable destruction and injury to vehicles, not to be exepcted in peace time. But, on the other hand, there is no reason why preventable "breakdowns" should increase appreciably. Such failures grow from faulty maintenance and in war, certainly, the maintenance factor can be stressed. True we may have to use vehicles to the very limit of their endurance just as men are often used, but, as with men, we should strive to avoid it. Every care is taken of the troops. Witness how men are fed, clothed, and doctored to keep them at the peak of battle efficiency. Moreover, inspections insure that no laxity creeps in. We must adopt the very same attitude toward motor vehicles. We cannot rely on sick motors any more than we can fight with sick men.

On the whole, motors in war seem to introduce us to a new military element. But history, when consulted, will indicate that the motor problem of today is in certain essentials similar to the military problem which arose when railroads were new. For instance: In the Civil War railroads were a new element in warfare. There were no books to tell what part they would play in campaign or how to handle them. On the whole the Union generals

seemed to grasp the function of railroads better than the Confederates. In one case, for instance, they quickly assembled by railroad an army in the vicinity of Chattanooga to rescue the starving army of Rosercrans. Furthermore, the Union leaders were strong for maintenance as indicated by the great concern of Sherman for the maintenance of his rail communications in the Atlanta campaign. Indeed, he was not above filching a few locomotives when they came puffing into his area, even though the railroad companies wailed loudly to the War Department.

On the other hand, the Confederates did not appreciate so readily the value of railroads and the necessity for their maintenance. Or perhaps it was because maintenance facilities were not readily available. Be that as it may, the fact remains that owing to the lack of a comprehensive maintenance plan, the southern railroads became extremely unreliable. The "life lines" of the Confederacy which could have been utilized for the rapid transfer of men and supplies from one theater to another "bogged-down" through lack of proper care and maintenance. Yet the Confederates, operating on interior lines, had far better chance to utilize railroads strategically than the Federals had. No doubt the Southern generals could see their advantages but the unreliability of the railroads prevented them from utilizing golden opportunities. Here, it will be noted that strategy alone was fettered because of unreliable means of communication.

For us then the lesson of the Civil War is that *maintenance* of the new transportation facilities (railroads) was a vital, and in certain cases, perhaps, a decisive strategical matter. From this comes the question: How much more important will this maintenance factor become with our modern motors which can, and have, been used strategically, but in addition are now penetrating deeply into the field of tactics?

How important this problem of motor maintenance is in civil life is disclosed by the studies made by the General

Motors Truck Company, an organization that has for many years cooperated with motor fleet owners in the development and improvement of truck maintenance. Three great facts stand out in their findings. The first is, that eighty-five percent of all break-downs are caused by failure to service minor parts which very often result in damage to major parts. The second finding, and one of extreme significance is this: Periodic attention to the entire vehicle at specified intervals eliminates most of these road failures and insures uninterrupted operation. The third finding, also of great importance, is that maintenance methods do not keep pace with automotive construction. This results in high operating costs, causes the discarding of vehicles at a much lower milage than is necessary, and raises the accident rate considerably. Considering all these facts carefully, together with the findings that the supply of proficient motor mechanics is extremely limited—certainly less than ten percent of those so rated—and we can see a rough outline of the problem that confronts our automotive army. It is not simple and cannot be solved by rule-of-thumb. In forty years we have moved from the horse-and-buggy age into an age of motors, But that period is not great enough to inculcate motor handling knowledge in people using and servicing automotive vehicles. It took eons to learn how to handle animal transportation; yet we have had only a few years to learn how to master and utilize the motor in war. It is well to remember that.

To get the proper perspective on this motor problem—fundamentally a motor maintenance problem—it will be necessary to make a rather close study of the practical methods used by civilian fleet operators and the ideas prevalent in the motor world. All data given hereafter and conclusions drawn from them are the result of a practical study which covered a wide range of territory, a large number of fleet operators, and a careful digest of civilian studies on the subject of maintenance.

MAJOR FACTORS INVOLVED IN EFFICIENT OPERATION

Investigation discloses that there are three major factors involved in the efficient operation of motor vehicles: first, the quality of the vehicle itself; second, the selection of the proper vehicle for the job to be jerformed; third, *proper maintenance.*

In this chapter we are mainly concerned with proper maintenance.

In the attempt to solve the problem of proper maintenance, manufacturers of automotive vehicles, after years of research, have established the milages at which certain vehicle parts should be inspected, adjusted, or replaced. Out of this constant checking and study of motor-vehicle operation has come a "repair-before-failure" servicing idea, founded on the axiom that "an ounce of prevention is worth a pound of cure." It has been found that by preventing the need of repairs, through periodic inspection and servicing, much "after damage" shop work is eliminated and greater road dependability is insured.

The purpose of any motor vehicle is to carry a given load, over a certain distance, reliably and efficiently. A motor vehicle should be continued in service as long as it meets these requirements. The question "How long will a motor last?" cannot be answered, except by "That depends, to a considerable extent, upon the quality of the vehicle, its adapability to the job, the work it is called upon to perform, *and the way in which it is operated and maintained.*"

Performance and economy of operation alone do not suffice to give efficient transportation. To these we must add the following: the operation of the vehicles must not be interrupted, and the equipment must be ready for service at all times. A survey of civilian motor fleets shows that a system of proper maintenance will do much to obtain efficient transportation as outlined above. Proper maintenance will show its effect by the elimination of mechani-

cal road delays; the reducing of maintenance cost-per-mile, and the reduction of the number of accidents. In short, it will keep the trucks rolling.

All experience shows that repairing is the last resort of maintenance. Therefore, every other means should first be utilized. It is axiomatic that *the maintenance efficiency of a fleet is inversely proportional to the amount*

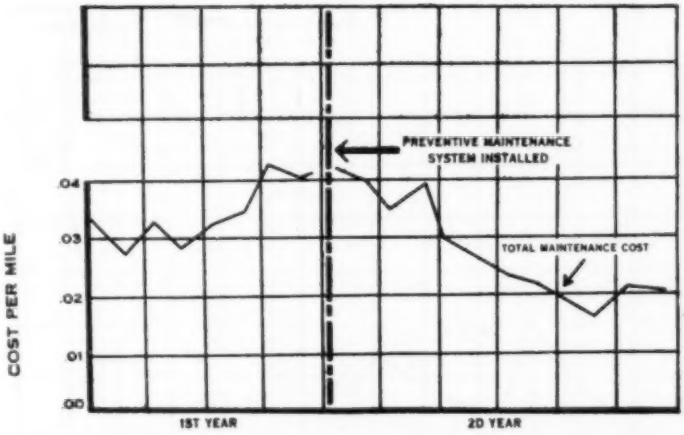


FIGURE 23.—Cost per mile before and after preventive maintenance was installed.

of repairing required. True, there comes a time when repairing is inevitable, but the maximum effort should be concentrated in postponing this time to the very furthest possible date. In other words, the aim, the primary objective of maintenance, should be to prevent repairs.

Thus we find a phrase, that is slowly but surely, invading the automotive industry—*PREVENTIVE MAINTENANCE.*

Preventive maintenance has for its fundamentals: regularity, uniformity, and thoroughness in the application of maintenance methods.

The advantages which have accrued by the employment

of a preventive maintenance system are indicated by the three examples which follow.

Figure 23 covers the operation of a fleet over a period of twenty months. A preventive maintenance system was installed at the end of the first year. While the mileage traveled remained at approximately 200,000 miles per month, maintenance costs showed a decided drop immedi-

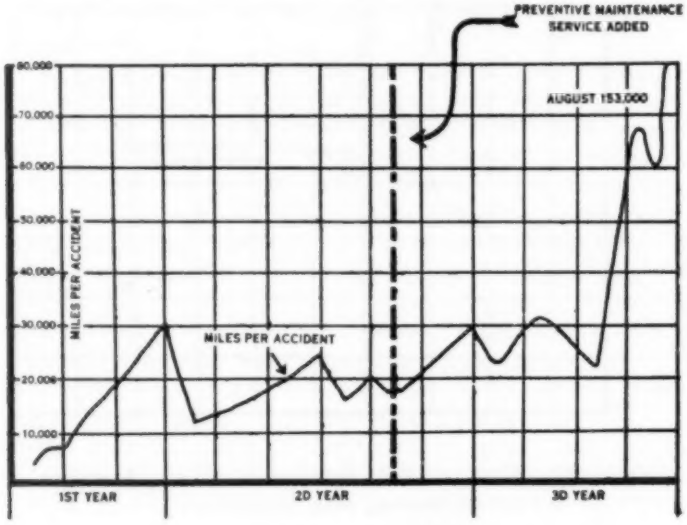


FIGURE 24.—Accident curve before and after preventive maintenance was installed.

ately following the installation of preventive maintenance. The total maintenance cost, which had been steadily increasing the first year to 4¢ per mile, was reduced slightly over 2¢ per mile a year later—and the curve continued downward.

Figure 24 shows the accident history of another fleet of approximately 200 trucks, operating in a large eastern city. This city presents a safety award each month to the fleet having the best safety record.

The fleet was in ninth position in August of the first

year. While some improvement was reflected during succeeding months, this improvement was extremely erratic until shortly after the installation of preventive maintenance in July of the second year. From that time on, improvement was rapid and in August of the third year, the fleet won the monthly safety award.

The solid line, which illustrates miles traveled per ac-

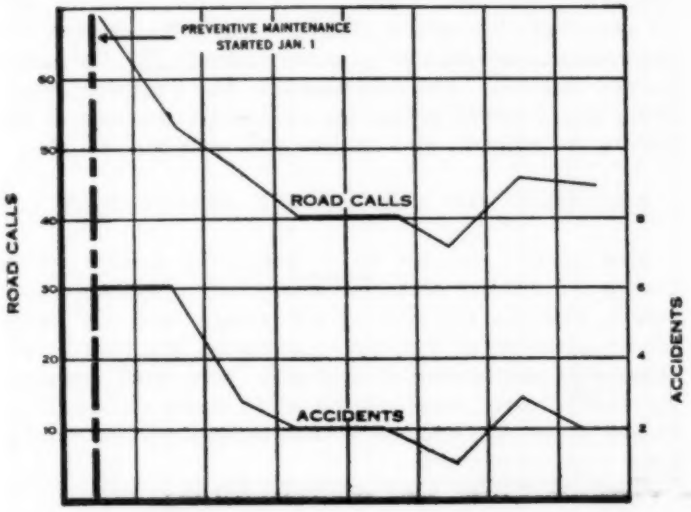


FIGURE 25.—Road failure and accident curves after preventive maintenance was started.

cident shows that in the first year, accidents were so numerous that it was difficult to determin the mileage between them. Steady improvement followed the installation of preventive maintenance. In the third year, the fleet had the best record in the city—153,000 miles without an accident.

Figure 25 illustrates a fleet operating in Philadelphia, Pennsylvania. Preventive maintenance was installed in January. At that time there were approximately 75 trucks in the fleet. As indicated by the curve labeled

"road calls", road failures decreased consistently. A low was reached when 38 road delays were charted, and this despite the fact that the mileage had been increased over 25 percent and the fleet almost 50 percent.

At the time preventive maintenance was installed, 6 accidents per month or approximately 1 accident to each 11 vehicles occured. This was reduced to 1 accident per month for each 54 vehicles. This experience shows, and all experience has shown, that it is the human factor, not the mechanical which is primarily responsible for motor vehicle failures. The manufacturer can engineer everything into a vehicle except the skill and expertness of the person or persons, who operate and maintain it.

FEATURES OF PREVENTIVE MAINTENANCE

Maintenance includes all of the many factors which reduce the number of vehicle hours lost to operation and which lengthen the life of the vehicle and its parts. *Under-maintenance* and *over-maintenance* are both costly. Adequate maintenance consistently performed prevents the costly major repairs incident to under-maintenance; it also avoids the expense of unnecessary service arising from over-maintenance.

What constitutes adequate maintenance is determined, to a large extent, by local operating conditions. For example: the primary concern of a large bus company is the condition of the steering mechanism and the alignment of front wheels, for upon these parts the safety of many passengers depends; on the other hand, because of dusty operating conditions, the principal concern of grading contractors with their motor vehicles is the servicing of air cleaners and oil filters, and problems of engine lubrication. The army problem is a unique one, and it will take time, experiment, and experience to work out the solution. Furthermore, it will call for intelligent supervision and control.

Only the intelligent and experienced executive—with the greatest emphasis on experience—is capable of determin-

ing those factors which are essential and those which are superficial in any plan of maintenance. As a consequence a maintenance system must be virtually a synonym for organization, in which simplicity is the predominant factor. From all this it follows that the peace-time system

FIGURE 26.—The wheel of preventive maintenance.

in the Army should be basically a laboratory for the study of wartime military vehicle operation and for this purpose we should utilize to the fullest the experience gained by civilian fleet operators.

The largest and successful commercial fleet operators hire executives with years of experience in automotive maintenance to determine what constitutes adequate main-

tenance. In the Army, these decisions frequently must be made by officers with little background and experience in automotive work. They may have only a mechanical and maintenance course of instruction to their credit. These officers should seek advice and guidance from the best qualified commercial fleet operators, adopting only what can be applied to military purposes and testing it out with war operation in view.

EXPERIENCED EXECUTIVES
(1)

In the wheel of preventive maintenance (Figure 26) the hub is the experienced executive. The effectiveness of each spoke will depend upon the executive's knowledge, training, and experience. However, without one of the spokes, the wheel will be weak and ineffective, or will break down.

DRIVERS
(2)

In a sense, the automobile comes from the factory an unfinished mechanism. It still lacks that most important part—the driver. A trained driver is the first step in any scheme of preventive maintenance. The commerical fleet operator devotes many hours to selecting and training his drivers. In the Army we must do likewise. A course of instruction of about one month is necessary to qualify drivers. The instruction should start with the theory of the operation of the vehicle and its parts. The course should include: instruction in traffic laws, instruction in military regulations for the operation of vehicles, lubrication, and a great deal of actual driving under the supervision of competent instructors.

MECHANICS
(3)

One mechanic can tighten a bolt as well as another.

The greatest difference between mechanics lies in the degree of thoroughness with which they do their work and the *reasoning they use in finding the causes behind the failure encountered.* Henry Ford made this last statement, and all experience has borne out his opinion.

The old time mechanic, who will neither keep abreast of automotive progress, nor use modern test instruments and shop manuals, is a liability to an organization. The successful mechanic of today is the man who does not guess but diagnoses the trouble, and once he has found the cause refers to his shop manuals or bulletins to determine how to correct it. He must be skilled in the use of tools and testing instruments and throughly familiar with all the servicing problems of his vehicle. There is a great similarity between the way a competent mechanic attacks his ailing motor, and the manner in which a modern clinic checks on an ailing human. However, while the patient may die and thereafter is out of the hands of an incompetent doctor, the mechanic and his boss will always have on their hands the limping motor.

CORRECT LUBRICATION
(4)

The solution to the problem of engine and chassis lubrication ordinarily can be found in the instruction booklet for the vehicle. In the rare exceptions, the manufacturer will be glad to give the operator the solution to any special problem in lubrication. In nearly every instance, part failures caused by improper lubrication are the result of the operators' failure to follow the lubrication instructions of the manufacturer. Modern chassis lubrication requires specialized equipment and a variety of special greases and oils. If the operator must purchase his own engine oils, it is important that he heed the advice given in all General Motors Shop Manuals: "The refiner or marketeer is responsible for the quality of his product. Their reputation is the car owner's best indication of quality."

TOOLS AND EQUIPMENT
(5)

Few operators are able to completely equip their shop at one time. It is important, in the Army, where funds are allotted irregularly and in varying amounts, that a careful program for the purchasing of tools and equipment for a shop be prepared. The operator should consult with his mechanics as to the type of tools and equipment they desire. He should then go to shops, which have been established for a long period of time, to find out the type of equipment that they consider to be the best and most useful. After this he should prepare a list of the tools and equipment, in the order of their usefulness and the need for them. The first items on this list might appear in the order listed below:

Good hand tools including micrometers and feeler gauges.
Good jacks.
Chassis lubricating equipment.
Simple battery testing equipment.
A vacuum gauge.
A compression gauge.
Spark plug testing and cleaning equipment.
Simple equipment for testing the alignment of front wheels.
A condenser tester.
A coil tester.
Ammeter.
Voltmeter.
Special tools designed by the manufacturer for the models of vehicles in the fleet.

SHOP FACILITIES
(6)

Automotive mechanical work can and is being done on muddy roads, in tents, and in every imaginable type of shed. But it is only in a well laid out, adequately lighted and heated shop that vehicles can be cared for properly.

There, mechanics can do their best work in the minimum time and with the minimum effort. Consequently, shops must be built and equipped to fit the needs of a particular operator. The best planned shops are those built under the supervision of an experienced executive.

In the Army, when planning shops and equipping them, the officer in charge should make a study of the most modern shops of successful fleet operator. The greatest temptation for an officer in the Army is to build an entire shop at once, regardless of its efficiency; whereas, it would be much better to build one complete wing or section at a time, as funds and material become available. This, as in the case of the tools, requires careful planning and building, according to a predetermined scheme.

FILE OF MANUALS
(7)

Well-thumbed shop manuals and manufacturer's bulletins are the best indication that mechanics are using progressive methods and substituting accurate information for more costly guess work. The mechanic who does not make use of these manuals cannot give the type of service nor do the mechanical work required on the modern motor vehicle. These manuals should be on file and easily accessible to the mechanics. They should include:

Shop manuals.

Bulletins published periodically by the manufacturers of the vehicles.

Bulletins of carburetor manufacturers.

Electrical specifications and bulletins published by the manufacturer of the equipment.

CONSTANT SUPERVISION
(8)

The officer in charge of military transportation must have sufficient technical knowledge, training, and experience to control intelligently all phases of motor vehicle

SERVICE	"A" Service 1000 Miles	"B" Service 5000 Miles	"C" Service 15,000 Miles	"D" Service 30,000 Miles
A Each 1,000 Miles	Every 1000 miles throughout life of the vehicle. Includes as principal operations general tightening and 1. Entire chassis lubricated. 2. Plugs cleaned and spaced. 3. Ignition timing checked. 4. Valves adjusted. 5. Carburetor adjusted.			
B Each 5,000 Miles	All "A" service items included.	Includes as principal operations: 1. Wheel alignment checked. 2. Wheels removed, grease retainers and bearings checked. 3. Brakes adjusted. 4. Axle U bolts tightened. 5. Crankcase ventilator cleaned. 6. Generator checked and adjusted.		
C Each 15,000 Miles	All "A" service items included.	All "B" service items included.	Major items checked includes as principal operations: 1. Cooling system thoroughly cleaned. 2. Valves reconditioned and springs replaced. 3. Fuel pump overhauled or exchanged. 4. Water pump repacked. 5. Distributor points, condenser and high tension wires replaced.	

D Each 30,000 Miles	All "A" service items included.	All "B" service items included.	All "C" service items included.	All major units inspected. 1. Transmission and differential removed, cleaned, inspected and adjusted. 2. Wheel bearings washed and inspected. 3. Spindle bolts, bushings, and tie rod ends replaced. 4. Clutch disassembled, discs, lining, etc., replaced. 5. Universal joints and center bearings overhauled. 6. Brakes relined and mechanism overhauled. 7. Pistons and rods removed. —Bearings and cylinder walls checked, valves ground and parts replaced where necessary.

CHART I.—Preventive Maintenance System.

NOTE.—"E" Service—generally performed at 60,000 miles—a thorough reconditioning of all major units is performed including a factory remanufactured engine or complete engine overhaul.

operation and maintenance. He must be able to determine and correct bad practices in his organization. Only by constant supervision of all activities under his control can he expect to maintain and operate his motor vehicles efficiently and economically. *Efficient operation of motor vehicles is in direct proportion to the amount of supervision maintained.*

HIGH STANDARDS
(9)

In the military service we have developed our own *standards* for such things as messes, store rooms, and the care of animals; but in the automotive maintenance, for the present at least, we can do best by following the *standards* of the successful commercial operators. What are these standards by which these operators gauge the efficiency or inefficiency of their fleet? Some of the more important are as follows:

Road failures.

Vehicle hours lost to maintenance and repair.

Accidents.

Maintenance cost per mile of operation.

Labor hours required per 1,000 miles of vehicle operation.

Life of parts and assemblies.

Fuel consumption.

Cost of lubrication.

From the data obtained under the above headings the various truck operators endeavor to devise certain principles of maintenance. They, naturally, vary somewhat but in general are much the same with all companies. After long study and experience the General Motor Truck Company reduces the important features of maintenance to five services, progressing from minor inspections and lubrication, as in service *A*, to major repairs and rebuilding as in service *E*. (See Chart I.)

A National Bus Company which in a maintenance competition, twice won the "Gold Award for Inter-city

Companies", has 701 busses, each of which operated in 1936 close to 250 miles a day. In this company, the maintenance is handled by 43 separate garages and service points. The record shows that 23.61 man-hours of maintenance are required for each 1,000 vehicle hours of operation. The company has less than a 3 percent reserve of spare vehicles, which is more than enough to meet the hours lost to maintenance. The outstanding features of the company's maintenance system are the strict adherence to periodic inspection, such as the one outlined in Chart I, and the replacement of units, rather than the making of repairs on the vehicles. Service delays, one of the most important gauges of maintenance, were reduced in 1936 to one for each 115,575 miles of revenue service. This company defined such an interruption as: "Any delay over 15 minutes due to mechanical causes."

The company had one accident for each 150,000 to 250,000 miles of operation. This record varies greatly in different sections of the country. Even a damaged fender is counted as an accident. Safety contests are conducted by the company for six-week periods. Great stress is laid on the discipline of drivers. The company takes the view that nearly all accidents are preventable; that, if the driver has an accident, it is his fault. Different types of badges are given progressively to a driver during his first five years of accident-free service. At the end of the fifth year, he is awarded a diamond button. Thereafter, he is given a uniform for each additional year. The remarkable thing about the system is the number of drivers receiving uniforms each year.

The drivers are selected, after a very rigid physical examination, from applicants, who, as a rule, have had a great deal of experience in driving busses. A two weeks' training course is given to these experienced men at a central school. While on the road, drivers are permitted only to change tires or replace spark plugs; however, a few reliable drivers are allowed to make mechan-

ical repairs of a purely emergency nature. In 1936, the maintenance, which included repair of buildings and fixtures, up-keep of grounds, and the salaries of superintendents, cost 2.878¢ per vehicle mile.

Another company, which won the 1936 "Gold Award for City Companies" in the same maintenance contest, had 65 vehicles (similar to those used in the Army). These vehicles had traveled an average of 172,510 miles. The total cost of maintenance was 1.69¢ per mile. In its maintenance report, the following statement appeared: "If the *guess* system can be positively eliminated from maintenance and the known system installed, then and only then, can we expect to obtain results so necessary to the industry and which do justice to the manufacturers of the equipment."

Briefly stated, this company's maintenance system is based on progressive inspections at 1,000—3,000—6,000—12,000, and 36,000 mile intervals. Following is a brief account of the work items completed in each inspection: At 1,000 miles the vehicles are given a lubrication inspection and are lubricated. At 3,000 the same procedure is followed. In addition, oil is changed, spark plugs are cleaned, breaker points checked, and the clutch is adjusted if necessary. At 6,000 miles the engine is checked for timing, carburetion, vacuum, compression, and valve clearance. Other items checked are the steering mechanism, drive line, springs, shackles, brake diaphrams, air lines, wheel alignment, seats, floors, doors, and door control apparatus.

At 12,000 miles the same procedure is repeated. In addition: the oil filter is renewed; the air cleaner is removed and cleaned; the front and rear wheels are removed, the bearings being checked and replaced if necessary; spindles, steering knuckle pivots, brake blocks, cams and bushings, rear axle shafts, and the steering system and parts are inspected, and replaced where necessary. The radiator is also drained and flushed.

Every 36,000 miles, the vehicle is given a general over-

haul. The experience of this company has shown the following to be necessary:

1. Valves reground at 36,000 miles.
2. Piston rings replaced at 36,000 miles.
3. Pistons replaced (standard size) at 72,000 miles.

Main bearings and connecting rods are replaced when found necessary at any of the 36,000 mile inspections.

The maintenance systems of the national bus company, and the city bus company—in spite of the variations in their operating conditions—followed generally the system outlined by the General Motors Truck Company. All three have systems based on the principles of uniformity, regularity, and throughness.

SIMPLE RECORDS
(10)

Army Regulations 850-15 prescribes the forms and records which must be kept by officers in charge of military vehicles. These records, if properly kept, are of the greatest value in maintaining control of a group of motor vehicles. They assist the officer in charge in locating and correcting faults caused by inefficient drivers, inspectors, or lubricating and maintenance personnel.

Commercial fleet operators early found it necessary to maintain simple forms if accurate information was to be obtained. Their mechanical personnel could not, or would not, properly accomplish reports difficult to interpret.

Systematic inspection and correction (11) is the last item of a preventive maintenance system. But though last, it is by no means least. So great is its importance that in the next issue of The Mailing List an entire chapter will be devoted to it. Both military and civilian methods will be discussed.

It cannot be too strongly impressed on all that motor vehicles are primarily an infantry problem. In the first place we are the prime users tactically; secondly, we are specifically charged with *preventive maintenance*. Fur-

thermore, all investigations and records show that it is *preventive maintenance* that keeps motors rolling. The inevitable conclusion is that ours is the most important job—we must become motor concious. We cannot run a vehicle into ruin and expect a prompt replacement. For infantry the matter of maintaining vehicles cannot be dodged, avoided, or passed to a supply department or service. Keeping infantry motor vehicles in running order is just as much an infantry function as keeping rifles in shooting condition. Until we adopt that attitude we are not ready for modern battle.

In closing it should be noted that the objective of both commercial and military operation of motor vehicles is the same—dependable transportation. This is obtained by using *preventive maintenance* and seeking to prevent the necessity for repairs by periodic inspection and servicing which reduce much "after damage" shop work, and insure greater road dependability by correcting minor troubles before they develop into major ones. This all goes to prove that the nursery jingle of bygone days—

> For want of a nail, the shoe was lost;
> For want of the shoe, the horse was lost;
> For want of the horse, the rider was lost;
> For want of the rider, the battle was lost;
> For want of the battle, the Kingdom was lost;
> And all for the want of a horseshoe nail.

—still applies.

CHAPTER 8

The Rifle Platoon in Foreign Armies

(AN INFANTRY SCHOOL STUDY)

An examination of foreign military developments during the past year reveals the effort of all armies to increase freedom of movement; or, putting it in other words, to guarantee continuity of offensive action. Mobility is the watchword. The result is that animals are giving way to motors, cavalry to combat vehicles, single action weapons to automatic arms; the role of aircraft is expanding, and troops march on wheels. In consequence, more attention is now given to distant reconnaissance, to all-around security, and to defense against aircraft and armored forces.

Preparations are being made for wars of maneuver wherein the relatively new arms and weapons will render maximum utility.

Notwithstanding these developments, infantry remains the most important arm and the one that is becoming the most complex and most interesting, for around it are being grouped all the new weapons and machines of modern war. The new fighting tools, the changes in tactical doctrines, the current conceptions of mobility, all these have affected infantry organization from the squad up to the division. Especially significant are the alterations which have been made in the smaller units. And, after all, once combat has begun, the job of fighting falls squarely upon the fundamental, elementary units—the squad, section, and platoon.

In the following pages we shall examine the current make-up of the platoon in several armies, and some of the considerations which have led to the adoption of diverse organizations. In view of the contemplated reorganization of our own rifle platoon, this study is now especially interesting.

Today we find in practically all of the large European armies a triangular organization within the rifle platoon; that is, a platoon composed of three "groups"—oversize squads to us. Only the Russians have four, their fourth group being armed with grenade throwers (light mortars).

These weapons in the Italian and French platoons are part of the armament of the three rifle groups. The British, German, Swiss, and Austrian platoons have no curved trajectory weapons.

Another change of note in the organization of foreign infantry is the elimination of combat groups composed solely of riflemen, as existed in the earlier German organization. Presumably the erstwhile conception of a coordinated, but separate, action by riflemen and light machine gunners no longer is envisaged as practical. Now each of the combat groups in the seven European armies named above contains a light machine gun (*fusil mitrailleuse*).

The Austrians, in fact, go even further; their group also has one *mitraillette*—a light automatic, probably similar to the so-called "tommy gun", for use in close combat.

Recent experiments in Italy indicate that a second light machine gun may be added to each Italian group. These additions are manifestations of the prevailing tendency to augment fire power in the locale of infantry combat.

A general survey of the platoons in the European armies under study shows that the number of men grouped around one automatic weapon is roughly an even dozen. The Austrian platoon, with two automatics per group, averages only six men for each; the Italian platoon, eight —if another light machine gun is given to each group.

Each British group—or section, as the British call it—

is much smaller, probably having only eight or nine men. Every man is armed with a rifle but all are trained to use the Bren light machine gun with which each group is equipped, and which it will use when needed to establish a base of fire. It is probable that one caliber 0.55 antitank rifle also will be allotted to each British rifle platoon.

The characteristics of all the various light machine guns in current use are much alike.

One idea seems to be common to the tactics of all these European platoons; namely, that the automatic weapon constitutes the vital center of the group. The Russians and Austrians even go so far as to call the group "an automatic weapon which attacks the enemy or stops his advance; the personnel surrounding it is only reinforcing and supply personnel."

This idea of a central weapon is being modified, however, for with the extra automatic which the Austrians and Italians are adding to their groups, the automatic—heretofore considered a *collective weapon*—is tending to become an *individual weapon.*

It is well to note here how the proposed change in the armament and organization of the U.S. platoon compares with the tendency abroad. It is proposed that individuals now armed with a bolt-action rifle be equipped with a semiautomatic rifle. Light machine guns are also part of the equipment of the experimental platoon. In this platoon there are four squads besides platoon headquarters. The eight-man, light machine-gun squad is armed with three light machine guns and five semiautomatic rifles. The three rifle squads each contain nine men armed with semiautomatic rifles. The platoon has no grenade throwers, but it is proposed that one—a light mortar—be included in the rifle company headquarters.

The Swiss, French, German, and Italian infantry differentiate between riflemen and light machine gunners by dividing the group into "specialist" teams—the rifle team and the light machine-gun team. Virtually, then, they have two small squads within the group, which in our termology might be called a section. The French,

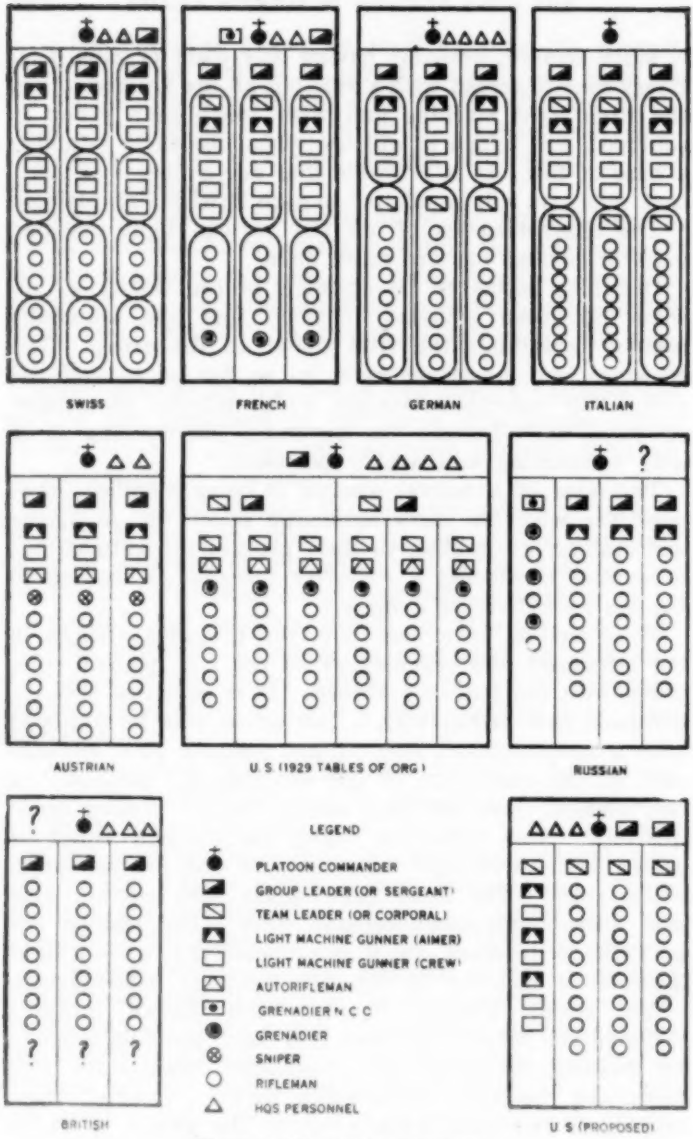


FIGURE 27.—The platoons.

Germans, and Italians have within the group one team leader—besides the group leader—for controlling one or the other of the teams. The British seem to consider the light machine gun as an accessory weapon—used when needed, but not habitually employed.

The number of noncommissioned officers in the several platoons varies considerably. The Swiss platoon has five; the French, nine; the German, seven; the Italian, ten; and the Austrian, only three.

The combat strength of these platoons is: Swiss—43; French—41; German—44; Italian—46; Austrian—46; Russian—37. (Our platoon under the old tables of organization has 58 men; under the proposed new organization, there are 41 men.) It is believed that the new British platoon numbers only about 25 to 28 enlisted men and one officer, for their four-platoon company has less than 125 men.

The way these different platoons look is shown in Figure 27.

It would be impossible to make a detailed study of the basis for the organization of each of these platoons, and the combat technique in which they are trained. However, their make-up and combat methods differ considerably from both our old and new platoon, and a closer examination of at least one of them is warranted. Let us, then, scrutinize the German platoon.

THE GERMAN RIFLE PLATOON

From battle experience in the World War the Germans evolved the *Einheits* combat group in which fire power and shock power are united. Deployed in battle it is the largest unit which in all situations is controlled by the voice or signal of its leader.

The Einheits group consists of the leader, a four-man light machine-gun team, and an 8-mm rifle team. One member of the rifle team is second in command of the

group. The group forms in line and column as shown in Figure 28.

As we have already seen there are three of these groups in the platoon, nine in the company. The platoon headquarters comprises a lieutenant (or sergeant), three runners, and a bugler.

The platoon also has a two-horse combat wagon, with driver and assistant. In this wagon are carried the packs of platoon headquarters, group leaders, and light machine-gun teams, as well as ammunition, grenades, the light

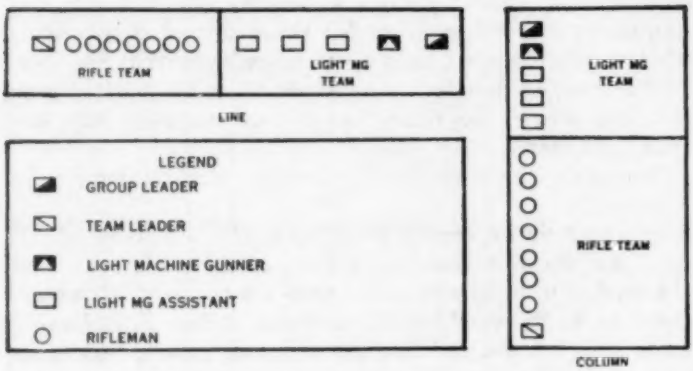


FIGURE 28.—The German rifle group.

machine gun, entrenching tools, gas neutralizing material, and spare parts. The wagon remains with or near the platoon until unloaded, and then joins the battle baggage of the battalion.

The line and column formations of the platoon are illustrated in Figure 29.

The group leader issues instructions for the employment of the teams. In combat he directly commands the team that carries out the most important combat mission.

The rifle team leader is the assistant of the group leader, and in combat usually commands the team which is not commanded by the group leader himself.

Within the light machine-gun team, Gunner No. 1 prepares and operates the gun during an engagement. He is also the leader of the light machine-gun team whenever either the group leader or rifle team leader are not present He carries four magazines of ammunition, a pistol, tool kit, and folding axe. During combat, Gunner No. 2 is the assistant of No. 1. He also takes care of ammunition supply. His main items of equipment are a carrying belt for the gun, two ammunition carrying belts (8 magazines), pistol,

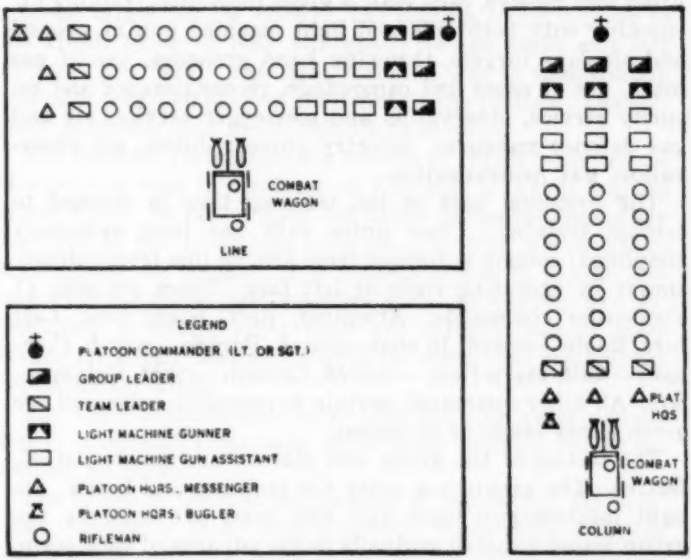


FIGURE 29.—The German rifle platoon.

and folding axe. Gunner No. 3 also carries eight magazines, besides a rifle, gun-carrying belt, and a short spade. Gunner No. 4 is responsible for contact with the platoon leader, neighboring groups, and the rifle team. If the tripod is taken, he carries it, sets it up, and holds it in position. He

also carries a short spade, a pistol, and one carrying belt of four magazines.

Members of the rifle team have the customary duties of riflemen. Their principal mission is to close with the enemy, using maneuver to assist the advance. The Germans do not contemplate or wish to encourage a fire fight by the rifle team. This, perhaps, is the main reason for not giving an automatic rifle to each rifleman, though excessive ammunition consumption also is a prime reason.

In addition to the usual recruit training, which all enlisted men receive, each man is given individual training in: shooting with both rifle and light machine gun at ground and airplane targets, throwing hand grenades, use of gas mask, use of cover and camouflage, reconnaissance and security service, observation and messenger service, air and gas defense measures, infantry pioneer duties, air observation, gas neutralization.

The principal part of the training time is devoted to combat training. Close order drill has been extremely simplified; column is formed from line, or line from column, simply by executing right or left face. There are only 11 close-order commands: Attention, Rest, Right *face*, Left *face*, Route—*march*, In step—*march*, Parade—*march*, Company—*halt*, Mark time —*march*, Column—*right*, Column—*left*. All other commands pertain to extended order and are given either orally or by signal.

The tactics of the group and platoon are simple but effective. The group is a unity for training and battle. Its light machine-gun team and rifle team are used by the group leader to assist mutually in the advance of each team. In defense the light machine gun furnishes the chief fire power while the rifle team protects and supports it.

The three groups form either group columns or group lines when they develop the platoon march column. At the head of the group marches the group leader, followed by the light machine-gun team, deployed or in column. The light machine-gun team deploys directly towards the enemy. The rifle team then deploys, moves in column, or infiltrates

to the right or left of the light machine-gun team as may be ordered. The light machine-gun team covers by its fire the maneuver of the rifle team. When this can no longer be done, the machine-gun team bounds forward to a new position. In this way the advance continues.

The Germans claim that a platoon in column of threes—groups abreast and each one in column of files—has many tactical advantages over the column-of-fours platoon (our formation of column of squads). In the first place, a column of squads offers, both in approach march and deployment, a broad target for the enemy. The leading squad deploys to the front, those in rear alternately to the right and left (Figure 30). Only one light machine gun is immediately available when employing the front of the platoon. Deployment is slower and more difficult to control.

The German formation of a column of threes with groups abreast and each in a column of files puts all group leaders at the front. In deployment for battle the outer groups are deployed in the front line (Figure 31). The center group may remain in reserve. The combat power is greater because two or three light machine guns, as desired, are immediately available since they are directly behind their respective group leaders. Figure 32 shows one method for deploying the group.

The light machine-gun team and the rifle team usually deploy separated from each other at an interval rarely exceeding 80 yards.

The group is the moving element of the battle. Its principal mission is as an attack group. Supporting weapons assist it but only the shock power of the group can defeat the enemy. The principal fire fight is conducted by the heavy infantry weapons (heavy machine guns and mortars) and the artillery. The group enters into the fire fight only to the degree necessary to close with the enmy. Seldom is firing done by the group at ranges greater than 400 yards.

The group begins to bring fire on the enemy as soon as it is close enough for direct effective fire. Then the advance

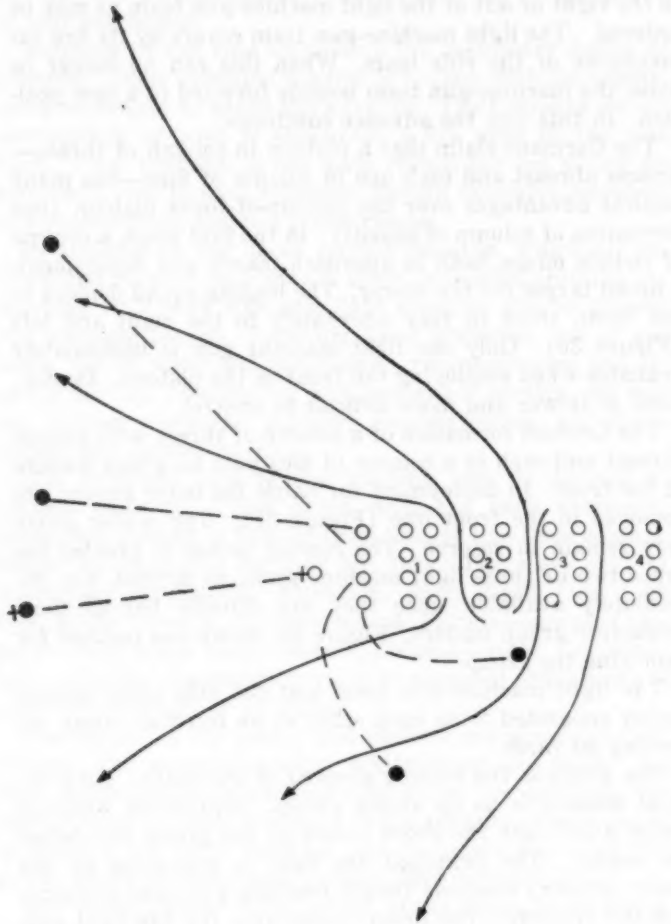


FIGURE 30.—Deployment for combat from four-column platoon formation.

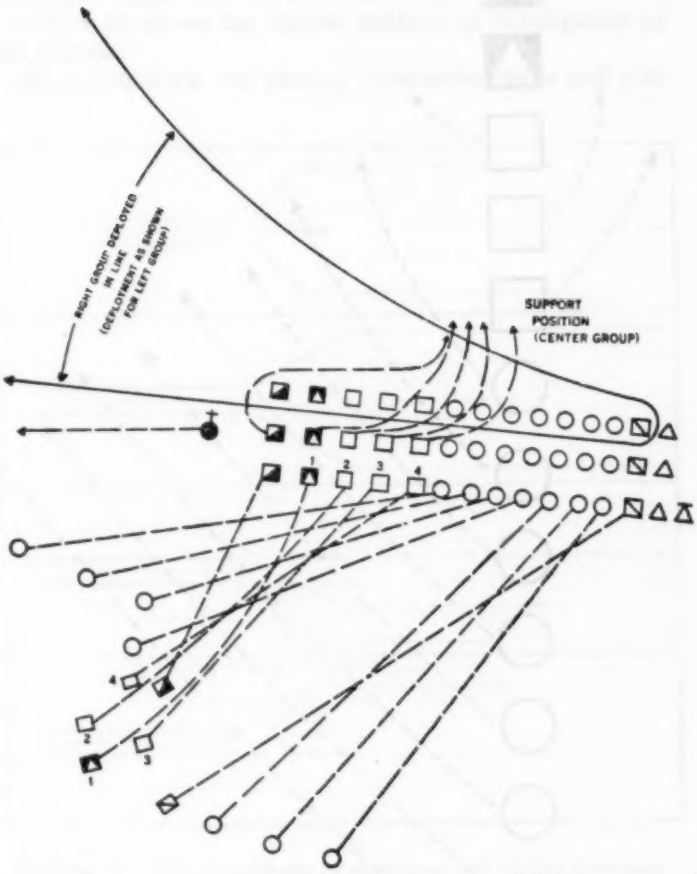


FIGURE 31.—Deployment for combat from three-column platoon formation.

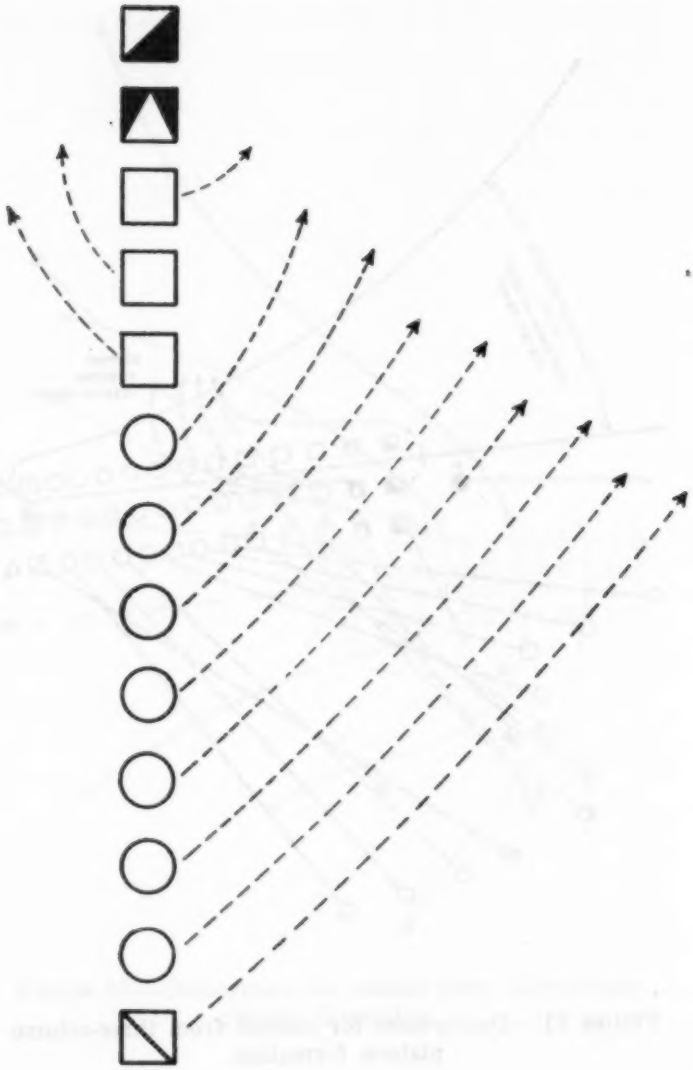


FIGURE 32.—Deployment of the rifle group.

by bounds begins under cover of the fire of the light machine-gun team. The use of scouts is habitual.

Figure 33 shows the various methods of development of the platoon.

When attacking, the platoon commander leads and con-

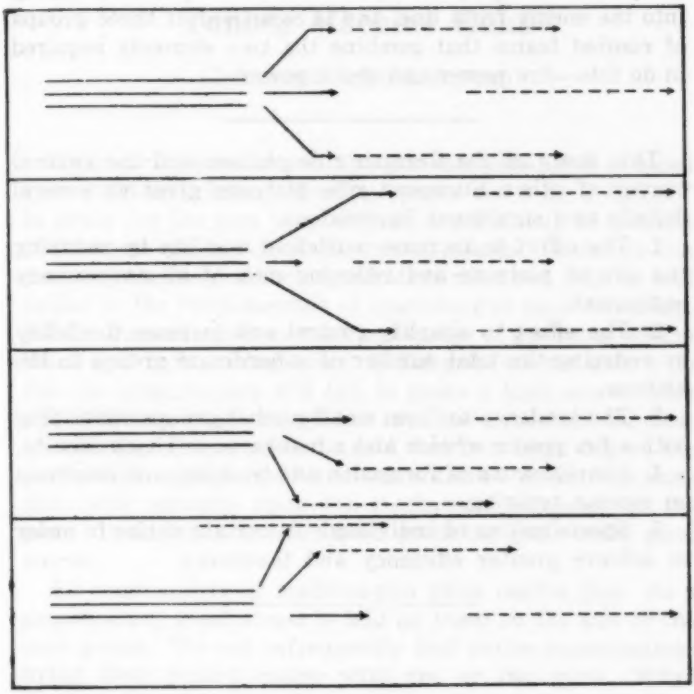


FIGURE 33.—Four methods of development of the German rifle platoon.

trols his three groups, generally from in front of the platoon. Frontages in attack vary from 150 to 250 yards. The depth of the platoon seldom exceeds 150 yards.

In defense, the frontage for a platoon is usually between 300 and 500 yards. When the platoon no longer can advance

it always digs in and prepares to resist counterattacks. The reserve platoon without orders habitually provides flank security for the company.

Modern war demands that the rifle platoon be highly specialized in combat technique. The German rifle platoon seems to be organized and trained to this end, for it consists of specialists highly trained in the technique of breaking into the enemy front line, and is composed of three groups of combat teams that combine the two elements required to do this—fire power and shock power.

This study of the German rifle platoon and the general survey of other European rifle platoons gives us several definite and significant impressions.

1. The effort to increase battlefield mobility by reducing the size of platoons and relieving men of all unnecessary equipment.
2. The effort to simplify control and increase flexibility by reducing the total number of subordinate groups in the platoon.
3. The tendency to form small combat groups containing both a fire power echelon and a maneuver or shock echelon.
4. Simplification of formation and training, and emphasis on combat training.
5. Specialization of individuals in certain duties in order to achieve greater efficiency and teamwork.

CHAPTER 9

Tuning Machine Guns

(INFANTRY SCHOOL STUDY)

The record course in machine-gun marksmanship is based upon 1000-inch firing. Scoring spaces are 3 by 2 inches.* In order for the men to qualify as experts only 13 percent of the shots can be out of the scoring spaces. To obtain this accuracy the men of the organization must not only be well drilled in the fundamentals of machine-gun marksmanship, but the guns themselves must be capable of grouping within this 3 by 2 inch scoring space. If the guns are not able to do this the organization will fail to make a high score. This will hold true even though the men have received the best of training. It can safely be said that to a large degree the percentage of high qualifications obtained in an organization rests squarely upon the mechanical efficiency of the guns. It amounts to this: good grouping guns make good scores.

All commanders of machine-gun units realize this. As a consequence, great stress is laid by them on the size of the shot group. We not infrequently find entire organizations firing their record course with one or two guns. Why? Because those guns will group smaller than the others. Besides, the men soon acquire confidence in the guns. With these particular guns they believe they can make good scores. It would be unwise to destroy this confidence by forcing them to use others.

Yet, to use one or two guns is obviously not good proce-

*New course now under consideration.

dure. Naturally we would like to find a remedy. A search for one will soon resolve itself into an attempt to answer these questions: (1) Are we attempting to make the guns do the mechanically impossible? (2) Do we lack the necessary mechanical skill for obtaining small shot groups? (3) Can most guns be made to do our bidding?

We believe that shot groups sufficiently small for marksmanship purposes are not difficult to obtain with almost any gun. But, we also believe it is necessary to know those factors that affect the size of the shot group, and to what degree, before the shot groups can be made larger or smaller at will. How can we get that knowledge? If we would like to know definitely how to make the machine gun shoot the group we desire, if we want a convincing reason—one easy to accept because of its soundness—we must have some means other than mere speculation or conjecture.

An attempt has been made at The Infantry School to find out those factors that change the size of the shot groups. It was done by a series of experiments with one gun, followed by verifying experiments with a number of other guns. Every effort was made to fire the guns under the same conditions. The experiments were based upon the conviction that changes in the shot group were caused by certain factors. A tentative list of these factors the product of long and close association with machine guns is given below:

1. Muzzle gland adjustment.
2. Head space adjustment.
3. Loose elevating screws, play in elevating screw housing.
4. Loose traversing screws, play in traversing screw housing.
5. Vibration due to looseness in the cradle.
6. The cyclic rate.
7. Mounting of the tripod.

8. Riding the gun.

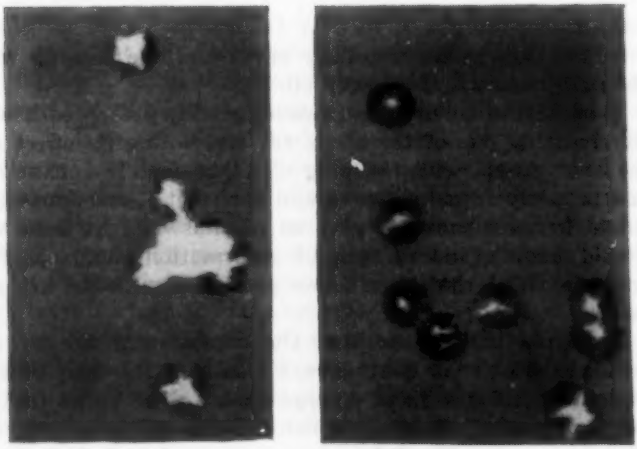
9. Friction in the recoiling parts and the feeding mechanism; worn parts; heavy oil.

A method of solving the problem quickly presented itself. By changing one of the above factors, noting its effect on the shot group, while keeping all other factors constantly and properly adjusted, we should arrive at conclusions that would in some measure give us the answer. At least we should have at our command information available for analysis. With that in mind we proceeded with the experiments.

It should be realized that the experiments are by no means exhaustive or conclusive, but even in the early stages certain significant facts emerge that are of value to the machine gunner. To really clinch these facts a longer period of experiment at The School and in the regiments is needed. But here at least we can show the trend.

MUZZLE GLAND ADJUSTMENT

With all the factors believed to affect the size of shot groups correctly adjusted, a series of bursts was fired at a blank target. (See Figure 34.) Notice the progressive

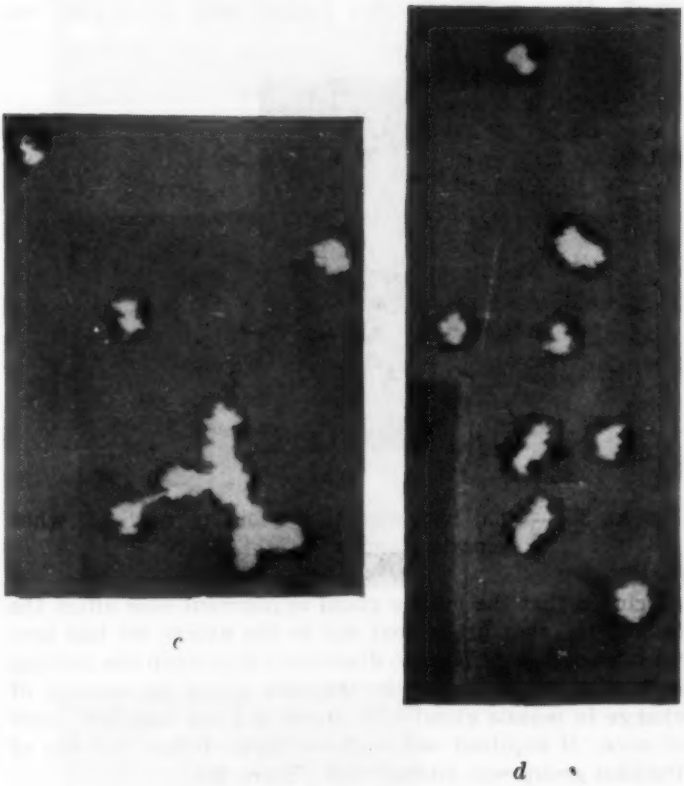


a *b*

FIGURE 34.—Result of muzzle gland looseness.
(See next page for *c* and *d* groups.)

increase in size of the shot groups. Investigation showed that the muzzle gland, tight to begin with, was now loose. This was due to the packing becoming compressed by the moving barrel and thus creating a looseness in the muzzle gland. The next group (see Figure 35) was fired with the muzzle gland tightened. Notice the decrease in the size of

the shot group. Just as we had always thought, loose muzzle gland—large group; tight muzzle gland—small group. Incidentally, we learned that the front packing does not



c *d*

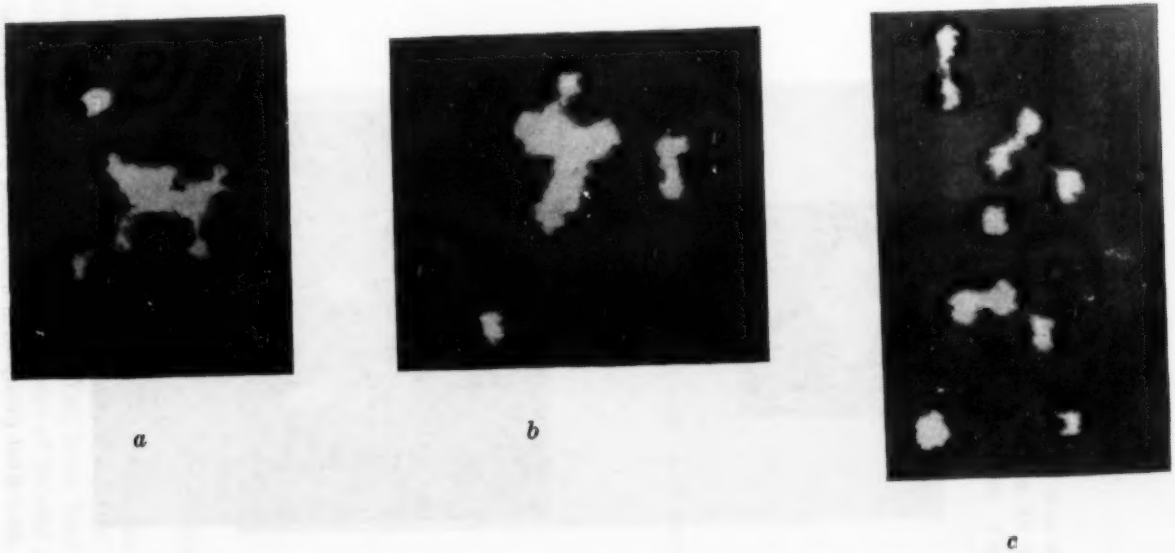
FIGURE 34.—Result of muzzle gland looseness.

seat itself until after the firing of about 150 warming-up rounds. During this warming-up period it was discovered that the muzzle gland adjustment had an appreciable effect

upon the size of the shot group. To keep the groups small, initially, it was necessary to keep the muzzle gland tightened after each burst. However, when the packing had seated itself, it was found that the muzzle gland needed little adjusting and that the shot groups remained constant and small. Upon getting similar results with other guns we

FIGURE 35.—What happened to *d* group, Figure 34, when muzzle gland was tightened.

concluded that the muzzle gland adjustment does affect the size of the shot group, but not to the extent we had previously supposed. We also discovered that when the packing is well seated a change in the shot group on account of change in muzzle gland adjustment did not manifest itself at once. It required two or three bursts before the size of the shot group was altered (see Figure 36).



a *b* *c*

FIGURE 36.—*a* shows group with muzzle gland unloosened. Note that it took three bursts before dispersion became great as in *c*.

FIGURE 37.—Shot group with head space correct.

FIGURE 38.—Shot group with head space 3 notches loose.

HEAD SPACE ADJUSTMENT

Look at Figures 37, 38, and 39. Figure 37 was obtained with head space adjustment correct. Figure 38 was obtained with head space lossened three notches. Figure 39

FIGURE 39—Shot group with head space 6 notches loose.

was obtained with head space loosened six notches. Figure 40 was obtained with head space again correct. Look at those changes in the shot group. Yes, loose head space is quite an element in determining the size of the shot group. If it is not properly adjusted the gun will not group, although

it will function smoothly. Therein lies the deception. With the gun firing perfectly, all other factors correct, but with head space only three notches loose, it is impossible to get a small group. This is an important factor in tuning a machine gun. The evidence indicates that small changes in head space adjustment will produce large changes in the

FIGURE 40.—Shot group obtained when head space employed in Figure 39 was corrected.

size of the shot groups. Of the two factors investigated so far, it seems that the head space adjustment has considerably more effect on the shot group than the muzzle gland adjustment.

It is perhaps best at this time to explain what we mean by correct head space adjustment. Head space adjustment is correct when the taking up of one or two notches on the barrel will prevent the release of the firing pin.

FIGURE 41.—Shot group with head space and muzzle gland loose.

Figure 41 was obtained with both head space and muzzle gland adjustment very loose.

FIGURE 42.—Shot group with play in the elevating mechanism.

LOOSE ELEVATING SCREWS, PLAY IN ELEVATING SCREW HOUSING

This experiment was fired with a one-sixteenth inch play in the elevating screw. (See Figure 42.) Note particularly the vertical dispersion. The next shot group

(see Figure 43) was obtained with no play in the elevating screw. The result obtained is self-explanatory.

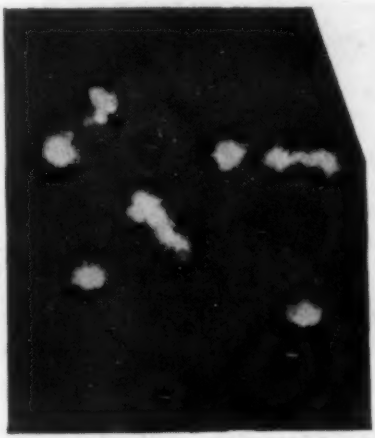


FIGURE 43.—Shot group after play was taken out of elevating mechanism.

LOOSE TRAVERSING SCREWS, PLAY IN TRAVERSING SCREW HOUSING

Figure 44 was obtained by firing the gun with side play in the traversing screw. The next figure (Figure 45) was obtained with this play taken out of the traversing screw. It shows a reduction in the horizontal dispersion of the shots.

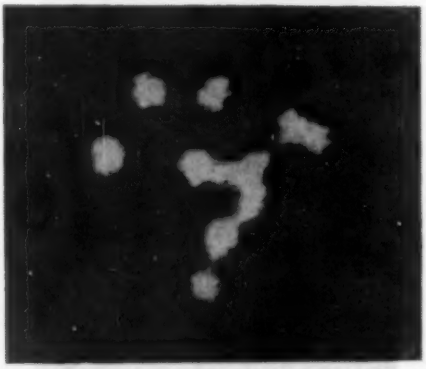


FIGURE 44.—Shot group with play in traversing mechanism.

VIBRATION DUE TO LOOSENESS IN THE CRADLE

The shot group obtained due to vibration in the gun because of looseness in the cradle is similar in nature and size to that obtained by a loose traversing screw. (See Figure 46.)

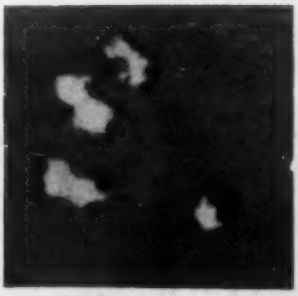


FIGURE 45.—Shot group after play has been taken out of traversing mechanism.

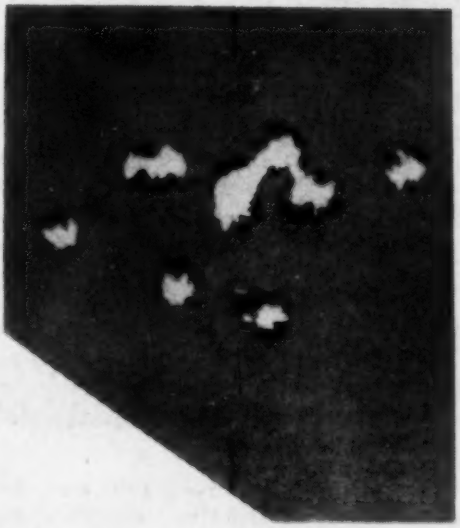
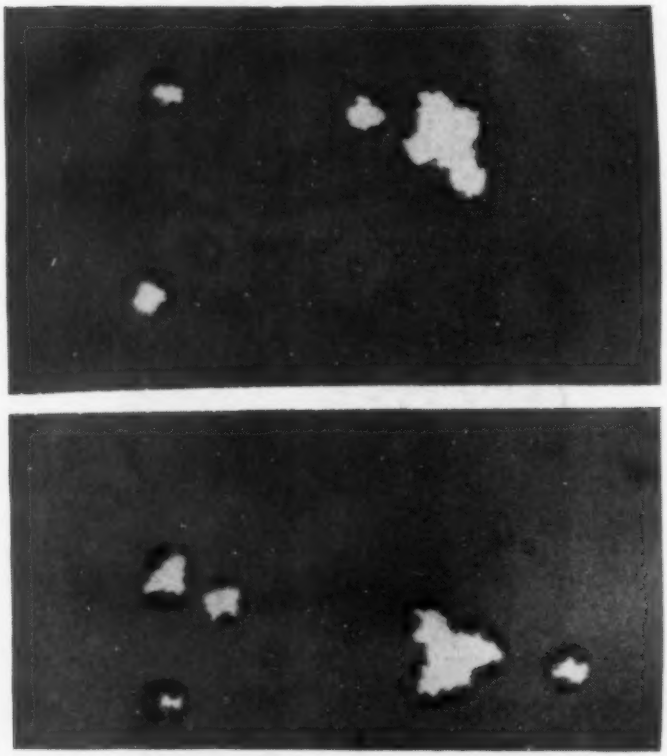


FIGURE 46.—Shot group due to looseness in the cradle.

THE CYCLIC RATE

The effect that this factor has upon the shot group is perhaps less known than that of the other factors. When

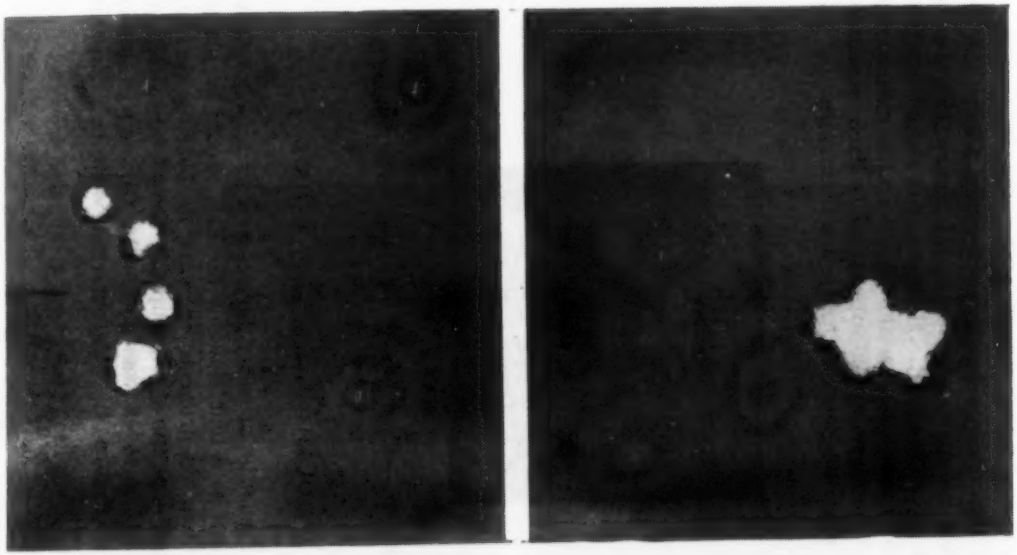


Group *b* (slower).

Group *a* (fast).

FIGURE 47.—The effect of a change in cyclic rate on shot group.

the gun is firing with the cyclic rate best suited to it there is a smoothness of operation which becomes quickly apparent. This smoothness of operation gives uniform performance. Quite frequently a shot is consistently thrown outside of a compact shot group. This often can be made an integral part of the shot group, by changing



Group *c* (still slower than *b*). Group *d* (slowest).

FIGURE 47.—The effect of a change in cyclic rate on shot group.

the cyclic rate. The correct cyclic rate for any one gun can only be obtained empirically. However, there is no doubt that change in the cyclic rate affects the size of the shot group. A glance at the figure (Figure 47) will show what is meant. However, one should not jump to the conclusion that a slow cyclic rate means tight groups. The opposite is often true. Each sensitively balanced machine gun has its own individuality.

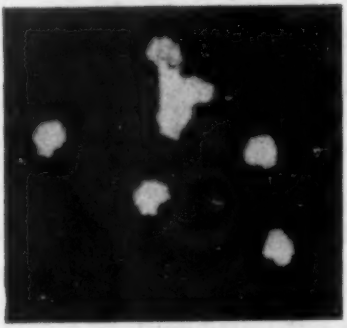


FIGURE 48.—Shot group obtained with support under the trail.

MOUNTING OF THE TRIPOD

The gun must be properly mounted on its tripod. Some support, such as a tent stake or the like, should be placed under the trail in order to increase its bearing surface. If this is not done the shot group will have a large vertical dispersion. Figure 48 was obtained with support under the trail. Figure 49 was obtained with this support removed.

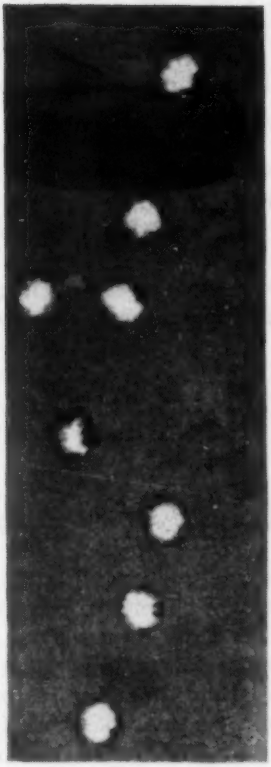


FIGURE 49.—Shot group obtained when trail support was removed.

RIDING THE GUN

Riding the gun is putting unnecessary pressure on the grip when firing the gun. This is one of the most prevalent methods of making a good grouping gun look bad. Shot groups of all descriptions can be obtained by riding the gun. They will vary in size and shape depending upon the amount and kind of riding done. All machine gunners know that a good shot group cannot be obtained if the gun is ridden. (See Figure 50.) Many low scores are attributed to reasons other than riding the gun. It is good practice to test the guns by experienced men whenever they seem to be grouping large. If an experienced gunner fires small groups then we know the guns are not at fault.

FRICTION IN THE RECOILING PARTS AND THE FEEDING MECHANISM; WORN PARTS; HEAVY OIL

These factors, together with others not mentioned, will also alter the size of the shot group but no test was made at this time to disclose their relative importance. In fact we readily admit our test is not exhaustive, but we believe the factors which we have discussed are of such frequent occurrence that they constitute the greater part of machine-gun tuning. At the same time it is realized that with certain guns it will take considerable work in replacing bolts, barrel extensions, barrels, adjusting the buffer mechanism, and so forth, in order to obtain a delicate gun adjustment that will minimize vibration and permit the adjustments noted herein to be made effectively.

CONCLUSIONS

An examination of the evidence we have presented led us to these conclusions:

1. The factors in our list alter the size of the shot group.
2. The relative degree of alteration these factors have

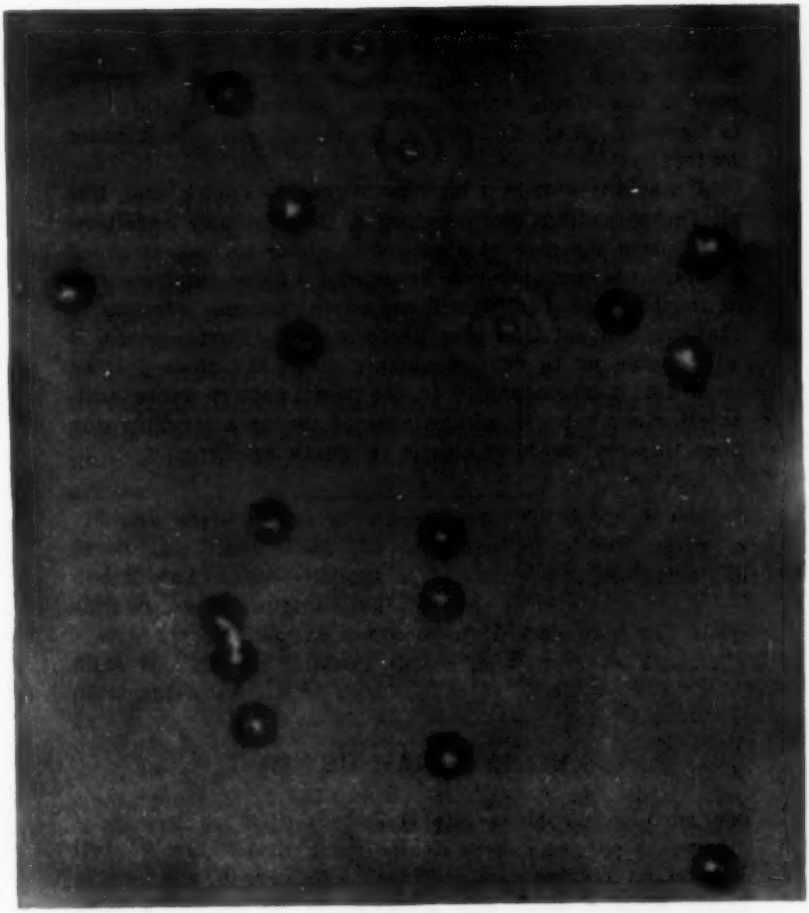


FIGURE 50.—Result obtained by riding the gun.

upon the size of the shot group is as follows:

First: riding the gun; second, head space adjustment; third, loose elevating screws, play in elevating screw housing; fourth, improper mounting of the tripod; fifth, muzzle gland adjustment; sixth, loose traversing screws, play in traversing screw housing; seventh, vibration due to looseness in cradle; eighth, the cyclic rate; ninth, other factors.

A machine gun is a high pressure gas engine and, like all fast-vibrating mechanisms, it is extremely sensitive. It requires the care of a skilled operator to keep it tuned for best performance. A knowledge of the fundamentals of machine-gun tuning will aid us in training gunners so that we can get this best performance. Furthermore, it will enable us to change quickly from the close pattern ideal for marksmanship, to the wide pattern more suitable for combat. If a knowledge of tuning a machine gun does this and nothing else it is worth knowing.

CHAPTER 10

Infantry Around the World

In this chapter are gathered numerous brief essays, many of them abstracts from articles written by various writers on military subjects. While many of the ideas expressed conform with opinions widely held in our own army, they do not necessarily express current teachings of The Infantry School. Several discussions are included, in fact, to show foreign viewpoints on current military topics. Others contain data compiled by military periodicals on the organization and equipment of certain foreign armies.

These matters are of more than ordinary interest to us at this time when the organization of our army is undergoing many changes and when new equipment is supplanting or augmenting the old.

It is hoped that the contents of this chapter will stimulate thought on military topics that are now especially pertinent.

ON THE WAR IN SPAIN

Spewed up with the blood and cobblestones from the little World War in the Spanish arena, are the fragments of many a disregarded principle. Concealed by censorship, distorted by propaganda and false reports, many of the fragments can nevertheless be easily recognized for what they mean. Pieced together we get some worthwhile conclusions. Here are a few that have been salvaged.

MAILING LIST—8

I

ANTIAIRCRAFT DEFENSE DURING MOTOR MOVEMENT

It is March in Spain. One of Franco's forces is moving in a tremendous motor column to its concentration point near Guadalajara and Brihuega, from where the new offensive is to be launched. Suddenly the air is full of droning Government planes which procede to machine-gun and bomb the column unmercifully. No antiaircraft measures are taken by the demoralized troops. Attack aviation scores a "max" on a perfect target—an aviator's dream.

Now it is the middle of May and the scene is Toledo. An Insurgent air squadron sights a withdrawing column of truck-carried Government troops and artillery, swoops down on it, almost annihilates it. According to the AP dispatch, the closely packed column was first struck by the bombers, then machine-gunned by low-flying pursuit ships—and "the squadron returned intact to its base."

Easy pickings!

Would we be as easy in like circumstances? Have we learned, even with the elementary schooling given by World War Fokkers, that when air attacks are probable, a motorized force must—

1. Avoid daytime movements whenever possible.
2. Avoid main paved highways, where practicable, in favor of secondary or third class roads, particularly in favor of winding or tree-covered roads which make effective air attacks difficult to deliver.
3. March in open formation—trucks in extended column. (For example, one-tenth mile between vehicles when closer intervals are not mandatory.)
4. Maintain air guards to give timely warning of approaching planes.
5. Have troops so entrucked that antiaircraft fire can be delivered from at least a few rifles or a machine gun in each truck.
6. When attacked, have vehicles turn off the road, where practicable, so as to clear the path of the attacking

squadron which invariably follows the road; have troops jump out, if time permits, seek near-by cover, and open fire on low-flying planes. (Where turn-offs are impracticable—as on paved, curbed highways and where soft terrain prevents, as was the case near Brihuega—safety is sought in speed and long intervals, plus fire from vehicles.)

It's epitaphs for the outfit that doesn't take these precautions against air attack.

II

LONE WOLF OR PACK?

Time and again during the early days of the Spanish conflict, attacks were staged by doughboys, by birdmen, or by tankers, acting alone. Each of these efforts demonstrated the ineffectiveness of solo operations. After several costly disappointments, suffered particularly by Government forces, a stop was put to most of these haphazard forays. The several arms began to coordinate with one another and soon proved what a united combat team could do. For example, in the engagement at Brihuega last spring when, quoting from *Time*, 5 April—"120 planes, 60 tanks and about 10,000 Government infantrymen (besides artillery) routed three . . . divisions of 5,000 men each." Not the defenders' cowardice—the heaps of dead attested their valor—but coordinated offensive action and mutual support engendered what was misnamed "a second Caporetto."

This offensive action by Government forces was really a large scale counterattack. A lone plane turned in an early report of the threatening Nationalist motor movement. The result of this timely information was that before the Nationalists had developed fully for their own intended attack they were knocked off their feet by a counterstroke. Here we see the value not only of coordinated effort but of reconnaissance, quick decisions, and an active defense.

III

OFFENSIVE OR DEFENSIVE?

For the most part, the first fifteen months of the war brought success to the offensives staged by the well equipped, well trained, Nationalist (Insurgent) troops. Despite this fact, the tremendous strength of modern defensive means has continuously been demonstrated. Witness the sit-down at the gates of Madrid, the long strugle for Bilbao, the defense of the Alcazar (by Nationalists) in Toledo, and the sieges of many another town. Mines, barbed wire, trenches, and death-dealing machine guns manned by a few stout-hearted gunners have combined to stop attacks and paralyze Spanish fronts just like they froze the great Western Front. The bitter realization that came in 1918 is not to be forgotten: one or two machine guns can sweep away whole companies, stop an entire battalion, create a stalemate.

IV

TANKS IN SPAIN

Tank performance on both sides has been disappointing and has disillusioned many of the erstwhile enthusiasts of armored attacks. The lightly armored Italian and German tanks used by the Nationalists have been riddled when they tangled with the heavily armed Government 11-ton tanks and semi-automatic 25-mm antitank guns. In retaliation for these knockouts the Nationalists' German-made 37-mm antitank guns have plugged many a Government tank. As ever, guns can be made stronger than armor, for armor is heavy and therefore must be kept within the limits imposed by mobility requirements. Seemingly these limits have been narrowed too much on the tanks used in Spain, particularly for the battle missions they have had to perform.

Some commentators point to these episodes as portents of the extinction of the tank. Such reasoning is of course unsound. The tank is here to stay just as the airplane will stay, despite the growing power of antiaircraft defense. But there is no doubt that some of the over-enthusiastic notions about the tactical value of tanks must be revised. They are not invulnerable land battleships capable, at any and all times, of clearing the way for infantry, but merely one of many mechanical aids to infantry advance.

As aids they too must be aided. They need supporting fires which will neutralize the enemy's antitank guns. Moreover the tank attack must be concentrated, delivered quickly, and in force, so that it comes as a surprise before an effective antitank defense can be built up at the point chosen for the blow.

It appears that not more than 50 tanks have been used on either side. Probably there are less than 100 tanks available to either adversary. What are 100 tanks on a 1500-mile front? It is no wonder that antitank measures have made the tanks at times look ridiculous.

Mines, obstacles, and antitank guns, these are to tanks what barbed wire, trenches, and machine guns are to foot troops. And the methods for overcoming each are much alike.

V

ANTIAIRCRAFT ARTILLERY

Judging from the toll of airplanes taken by Nationalist antiaircraft batteries, the odds no longer are so strongly in favor of the sky riders and raiders. It is contended that any single plane flying over modern antiaircraft guns below 12,000 feet in moderately clear weather will be downed within fifteen shots. Where, in the World War, five planes were brought down by aircraft for every one brought down by antiaircraft, today, in Spain, it is claimed the situation is reversed—only one plane is brought down by aircraft for every five disposed of by ground gunnery.

These results achieved by ground defense justify the establishing of antiaircraft artillery units at vital air objectives. Though the destruction of all enemy planes cannot be expected, enough may be accomplished by antiaircraft artillery to make enemy aerial operations costly and of doubtful military value.

It is argued by some that the whole Spanish conflict is too small in scale to prove anything about the use of modern weapons. Such reasoning may be well founded in part, but the civil war is none the less an example of modern, mechanized war. Besides, it appears to be the proving ground of several nations for testing their latest weapons and how to use them. As onlookers we too can get a few tips.

The general conclusion to be drawn from events in Spain may be put as follows:

No new annihilating weapon of surprise which would assure immediate success to an aggressor has yet appeared. In fact, such improvements in weapons as have been made leave the relative positions of the attacker and defender about what they were.

The effect of the development of air power has been to force the scattering of troops in small units for self-defense. Mechanization and the use of machines with small crews like tanks have produced the same effect.

Small units must rely to a considerable extent on themselves. This requires quick-witted, self-reliant soldiers. It would seem that such men are more likely to be found in a country such as ours, and in other democracies, than in countries where personal initiative is choked. It must not be overlooked that the soldier in bearing and action follows the pattern of the social system from which he is drawn.

HEAVY INFANTRY WEAPONS IN OTHER ARMIES

From various unofficial sources have been gathered brief data on the assignment of heavy infantry weapons in various armies This information is believed to be reasonably correct as of 1937.

In the British Army, the heavy machine guns and antitank guns are grouped in machine-gun battalions (two battalions in each infantry division); mortars are in the headquarters company of the rifle battalion.

The French have a combined machine-gun and mortar company in each rifle battalion, also separate machine-gun battalions. The infantry regiment has a combined mortar and antitank-gun company.

Heavy weapons in the German regiment are disposed as follows: heavy machine guns in a company assigned to the rifle battalion; antitank guns in a regimental company and minenwerfers in a regimental company.

In the Italian regiment infantry cannons (and antitank guns?) are organized in companies under regimental control. The heavy machine-gun company is a battalion unit.

The Russian battalion has heavy machine guns, but other heavy weapons are a part of the regimental echelon.

In Japanese infantry regiments heavy machine guns are allotted to rifle battalions, while antitank guns and light artillery are retained in separate companies under regimental control.

Formerly each Belgian infantry division had a machine-gun battalion and a mortar battery. These were eliminated in April, 1937. Now each infantry regiment will have a 4th battalion made up of a regimental machine-gun company, a 47-mm antitank-gun company, and a 76-mm mortar company.

The experimental regiment being tested in our Army comprises three rifle battalions devoid of all heavy weapons, and a 4th Battalion containing the heavy machine guns and antitank guns. A light mortar is given to each rifle company. Heavy mortars were a part of the 4th Battalion in the 1935 test organization, but in the current

test organization these weapons are made a part of divisional artillery.

A SURVEY OF CALIBER 0.50 MACHINE GUNS

Machine guns in the 0.50 caliber range currently found in many armies are used primarily against armored combat vehicles and low flying airplanes. Their use as an antitank weapon, however, is diminishing, owing to the need for a heavier weapon capable of penetrating thicker armor plate. The average caliber 0.50 can penetrate but a little over one-half inch of armor at normal impact (90 degrees to surface) at ranges up to 500 yards, and therefore is suitable only against lightly armored vehicles such as armored cars and tankettes.

Gun bores vary between 0.473 and 0.550 inch; muzzle velocities, between 2,500 and 3,300 foot-seconds; maximum ranges, between 5,500 and 10,000 yards; effective ranges, between 2,200 and 5,500 yards; total weight, between 220 and 660 pounds.

The principal data on these various guns is tabulated below.

EXTRA HEAVY MACHINE GUNS

Make	Caliber (in.)	M. V. (f/s)	Range		Rate of fire per minute	Weight (lbs.)	Projectile weight (oz.)
			Horiz. (yds.)	Vert. (yds.)			
Fiat	.473	2945	.....	.....	.....	484	1.4
Fiat	.492	3080	.....	.....	.....	264	1.4
Vickers	.500	3000	7000	5470 (?)	450	615	1.58
Browning	.500	2620	9000	2190	600	363	1.83
Browning	.520	2620	9850	2190	.....	363	1.83
Hotchkiss	.520	2620	7650	3280	250	286	1.76
Scotti	.520	2780	.....	.....	400	.....	1.83
Ernesto Breda	.550	3280	5470	4380 (?)	200	220	2.11

AND SUDDEN DEATH

. . . came to the scouts who marched in front of their deployed platoons until fired upon. They had been taught to do this in peacetime combat practice and maneuver, but weren't told that being fired upon by machine guns playing for keeps meant stretcher bearers to all who didn't keep out of sight.

Sudden death also came to the corporals who ran forward to get wise to the enemy firing upon their scouts. During the moment before the lights went out they wondered where in hell the enemy was; why he didn't indicate his position like he was supposed to do. They also wondered what was wrong with the books and the lieutenants that had taught them this suicidal conduct.

But sudden death came to the lieutenants themselves when, with pistol in one hand and field glasses in the other, they dashed out ahead of their platoons to lead them forward. Whereupon the advance wavered and stopped. Had these leaders restrained their impulse until the critical moment, their brave example might at least have brought about a local success.

Again sudden death came wholesale when the whole force was ordered to attack the hostile positions, it having been calulated that the enemy had only two-thirds as many men as ourselves. To those looking for rules of fighting—and there are many such—that was the rule in school: with better than a three to two superiority, attack . . . or else take a U. The other factors entering into the problem were neglected for the numerical one. And there is just enough soundness to the numerical rule to get the pedantical student by his course. But it will not get him through a battle for he has forgotten the strength of the defense.

Away back in the World War when there were fewer automatic arms than today, it often required a numerical superiority of ten to one to break through an organized defense, and then only at a terrific sacrifice in men and munitions. However, it took a long time to learn this

fact. And a long time to convince the indoctrinated and imbued believers of ritualistic combat technique, that everything must be massed in order to break a hole in a fortified line comprising trenches, wire, concrete, and machine guns. The lesson was expensive, but finally was learned.

But now again, where are we? Judging by the looks of some field exercises, right where we were in 1917. The lesson didn't stay learned. In fact an utterly false picture of battle is being presented today which is nothing less than unpremeditated homicide. There should be a law against doing in maneuver what in war will lead inexperienced officers and men to sudden death without benefitting anyone but the enemy.

Some of the errors frequently committed in peacetime maneuvers are listed in an article in the German *Militar Wochenblatt* of January 1, 1937. There are:

1. Under blank ammunition fire mounted officers ride about bravely, and nothing will stop reconnoitering cars.

2. Troops march in closed platoons and companies in the zone of enemy fire, and reserves deploy too late.

3. Defending units retire too soon and a false idea of the power of the attack obtains.

4. The best men are sent forward as scouts and go on until they are fired on—and in war, killed. This practice may be necessary in a wood, but on open ground the scouts should go only so far forward that they can watch the ground in front of the enemy and keep an eye on him.

5. Runners, too, are sent back across ground under the enemy's fire.

6. Company, platoon, and section leaders rush forward in front of men under aimed fire: they should reserve such personal action until the decisive stage.

7. Small detachments to avoid ground seen to be under artillery fire, move 20 to 30 yards away from it; they forget the spread of high explosive.

8. The commanders of infantry guns and machine guns should be told where their fire is wanted, not where to place their weapons.

9. The engineers are broken up and distributed instead of being kept together in reserve for special tasks; indeed, special tasks rarely are allotted to them.

Reading that list is rather comforting. Apparently ours is not the only army whose field exercises lack realism. Everybody seems to be doing it. But that is no reason for continuing to present a false picture of battlefield conditions.

Of course, we should not let up on boosting the offensive and the will to win—already too many officers are wedded to the idea of winning wars with a series of active defense battles. But we must always inculcate a holy respect for automatic weapons by hammering on this proven fact: *On the battlefield, a man seen is a man hit.* And if anyone is looking for a rule of war, there it is.

PANIC IN WAR

The 38th and 43d German Brigades began the attack of Boncelles, Belgium on the night of August 5-6, 1914. Arms were unloaded and orders given to do no firing. Advancing through woods where they couldn't see 20 yards in front of them, they were attacking an invisible enemy.

Suddenly firing began and spread in all directions. No one knew the strength of the enemy. Coming unexpectedly the fusilade created a panic.

Everybody began firing, firing at one another, and the panic spread as the dead and wounded piled up. Men no longer recognized each other; officer's voices were lost in the growing pandemonium. Even the commanding general of the provisional division was wounded in the arm with a bayonet by one of his own men.

Daybreak restored a measure of calm but a retreat was ordered which soon became a disgraceful rout. Yet, as later events proved, both the 38th and 43d Brigades were composed of excellent troops.

This affair shows that particularly at the beginning of

a war every unit, regardless of what it is, may on a slight provocation become subject to mass hysteria, lose all its combative value, and become completely uncontrollable.

Once panic has started, it is almost impossible to stop it. Leaders are next to powerless. The time to stop this group madness that feeds on fear and distrust is before it begins.

The astute leader will find ways and means of gaining and maintaining the confidence of his men. Common sense, a sympathetic understanding, and a calm, cheerful, confident demeanor on the part of leaders quickly are noted by the rawest troops and soon inspire their trust. This trust in turn inspires mutual faith among the men, and converts them from a crowd of suspicious individuals into a team working toward a common purpose.

Those who fail to fit into the team and shirk their duties must be eliminated if the team is to function as one collective personality.

In his personality the leader plays the dominant role. By controlling himself and exhibiting confidence, cheerfulness, and determination—even though fears assail him inwardly—he will be able better to control his men at crucial moments, for they will reflect the spirit which he has inspired.

SHUTTLING TROOPS

"Shuttling of troops" is a relatively new term but the procedure involved is as old as the most elementary means of transport. There is, however, considerable significance attached to the application of this procedure to the movement of troops by motor transport. Of course troops were moved by motor as long ago as the World War but the motors used were vehicles especially allotted for a certain movement, such as the fleet of French camions detailed to haul the 2d Division from Les Dacids to Marcilly on July 16, 1918, in order to participate in the Soissons offensive.

Even in 1914, motors for troop transport became legen-

dary when Manoury's army dashed out of Paris in taxicabs to strike the flank of von Kluck's First Army. In February, 1916, the defense of Verdun required that 13,600 troops and 1,500 tons of ammunition be hauled daily over the famed Via Sacree. All told the French *Service Automobile* transported more than 24 million troops during the war, an achievement without peer in the annals of military motor transport. During the St. Mihiel and Meuse Argonne offensives our First Army, using French motor *groupements*, transported a total of 519,900 men an average of 48 miles. These vehicles operated as army trains over guarded roads on definite schedules which were carried out not unlike the standard system of dispatching railway trains. Even the ultimate destination could be changed, when en route, to meet the changing military situation.

Similar movements will be commonplace in the future. But this method of transportating personnel is not ordinarily a shuttling operation.

Today Infantry is particularly interested in the use of *organic regimental motor vehicles* for moving the whole regiment or large fractions thereof in both strategical and tactical marches. The limited number of vehicles which are organically assigned, and the normal loads which many of these must carry, precludes transporting the entire command in one run. One or more additional runs are obligatory; that is, the troops must be "shuttled" to their destination. To see how this is done, let us first turn to a homely situation, containing a simple requirement, and determine how it might be solved.

You have offered to take a dozen boys, your own included, to the lake 50 miles away for a week's camping trip. To be carried along are three tents, bedding, cooking utensils and food. When packed, these items leave room only for yourself and one boy in your five-passenger car which must do all the hauling. It is 8:00 AM before you get going and you want to be all set up by 5:00 PM tonight, with everyone at camp. You can average 35 miles per hour.

Requirement: How do you do it?

The solution is simple enough. Eleven of the boys are started out on foot while you drive the loaded car and one boy to the lake, dump the luggage, and leave the boy to guard it. Retracing your route you meet the other 11 about 9 miles out from their *initial point*, they having walked over 3 hours during your 91-mile journey. You turn around and load the six who are most fagged out, then return to the lake and drop them. You eat a couple of sandwiches with the boys at the lake, and turn back to pick up the other five. Meantime they have eaten their sandwiches and trudged five more miles, so you go only 36 miles until you meet them. Everyone is at the lake before 4:00 o'clock and camp is pitched by 5:00, for the early arrivals had most of the work done when you completed your last trip.

You might have let the boys sit at home to await your return. In this case you would have retraced the entire distance on each return leg. The boys would have had little fun and no exercise, and you would have had to drive 46 miles farther, causing your final trip to be completed about 5:00 o'clock.

The precedure just outlined is a small edition of the way the organic vehicles of a motorized regiment can be used to deliver their customary loads at the next bivouac, and then make additional trips to haul the non-motorized troops to the bivouac. Oftentimes on the initial run, troops in vehicles carrying no other loads are discharged at several hours' marching distance from the destination, to which they then continue on foot while the empty vehicles return for another load. In this way two or three trips may be made during the day by vehicles not required for other purposes. (See graphs Figures 51 and 52.)

The pick-up points should be definitely determined. The vehicles should be turned around before the troops are loaded. Reasons: less likelihood of accidents, less confusion, greater comfort for troops, a chance to refuel before troops are loaded.

Organically available for shuttling troops in a motorized regiment are the trucks of machine guns and other supporting weapons, and the baggage, ration-kitchen, and combat

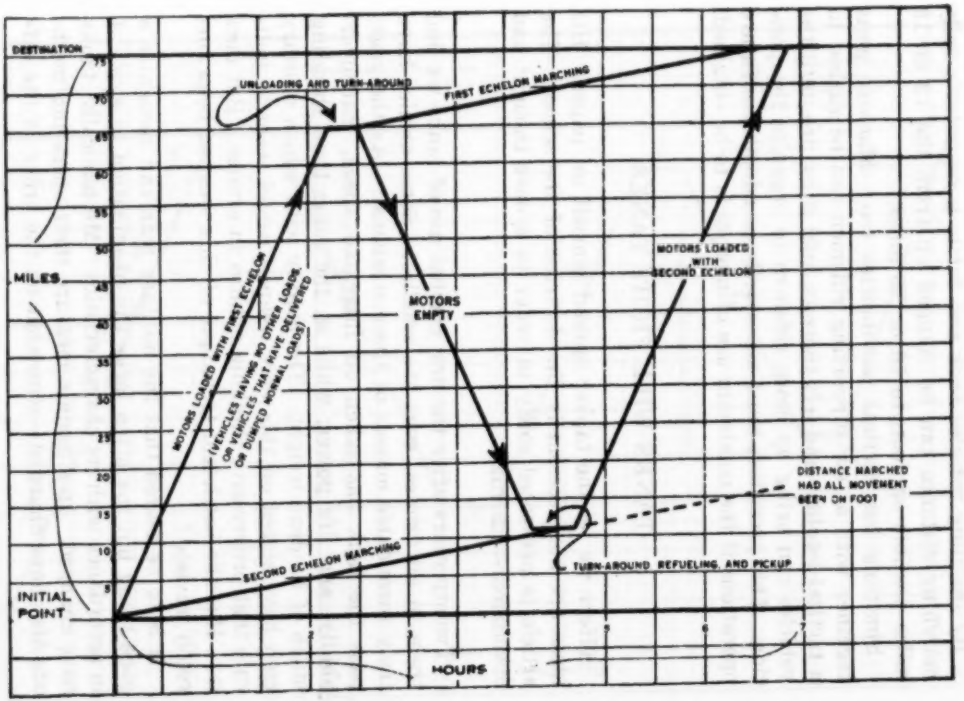


FIGURE 51.—Graph of 75-mile troop movement combining marching and shuttling, using organic motor vehicles.

train trucks—in all, upwards of 100 vehicles or more, depending upon the degree of motorization of the regiment.

By shuttling vehicles back and forth, a regiment's daily marching distance can be stepped up from the 12 or 15 miles possible on foot, to 50 or 75 miles.

Shuttling has tactical possibilities too. Machine guns together with a few supporting riflemen can be rushed to a tactical locality, and left there to hold it by fire until the vehicles can bring up more riflemen to organize the position. This procedure must necessarily be adopted in future operations if the maximum use of motors is to be obtained.

TANKS WILL FIGHT TANKS

(Here we let the tanker spread himself on paper. His ideas are not necessarily the doctrine of the school. The article is presented solely in order to arouse thought and discussion.—EDITOR.)

Twenty years after the first combat use of tanks we find them in all armies, even the smallest. Some armies have truly formidable masses of these weapons.* As the years pass the tank has taken on increased speed, maneuverability, and fire power, while at the same time shedding much of its dead weight. The avidity with which military men have seized on this new weapon would seem to indicate that progressive thinking obtains in armies. But does it? Has the battlefeld technique of this weapon been correctly revised?

It is to be feared that the military man can recognize a good thing but too often lacks the imagination to apply it in accordance with its characteristics. Mechanically, tanks have changed. In a certain measure their operating methods also have changed—somewhat on the order of the dif-

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*Various estimates credit Russia with more than 4,000 tanks; France with 3,500; Germany, 2,000; Great Britain, Italy, and Japan, 500 to 1,000 each.

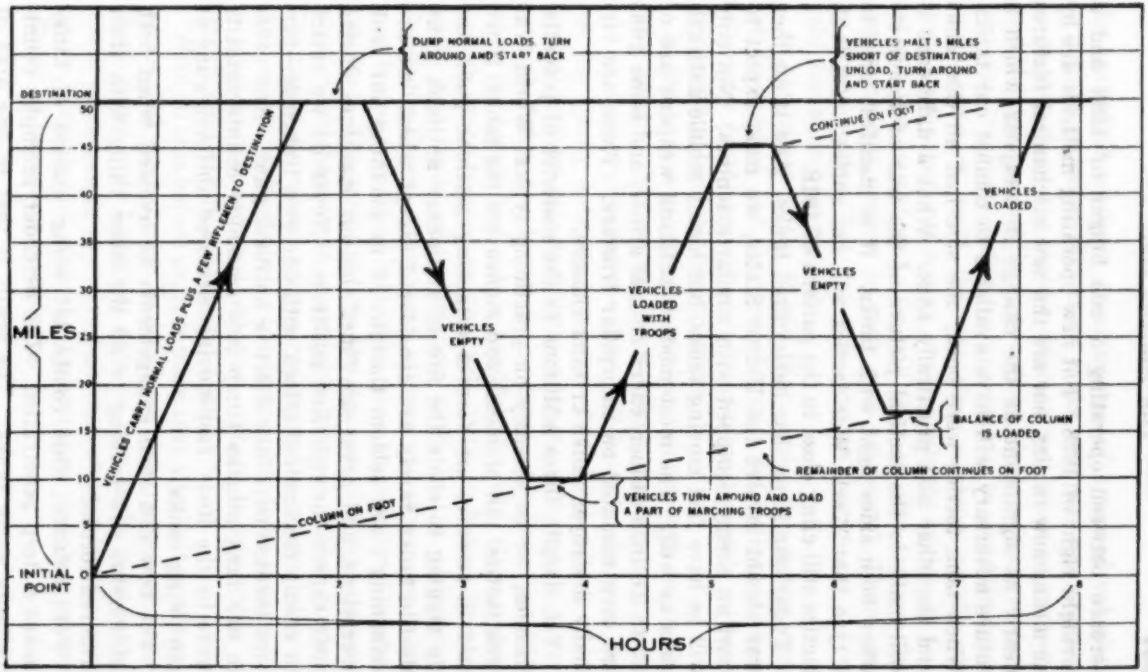

DESTINATION
MILES
INITIAL POINT
HOURS
VEHICLES CARRY NORMAL LOADS PLUS A FEW RIFLEMEN TO DESTINATION
DUMP NORMAL LOADS, TURN AROUND AND START BACK
VEHICLES EMPTY
VEHICLES LOADED WITH TROOPS
VEHICLES TURN AROUND AND LOAD A PART OF MARCHING TROOPS
COLUMN ON FOOT
VEHICLES HALT 5 MILES SHORT OF DESTINATION UNLOAD, TURN AROUND AND START BACK
CONTINUE ON FOOT
VEHICLES EMPTY
VEHICLES LOADED
BALANCE OF COLUMN IS LOADED
REMAINDER OF COLUMN CONTINUES ON FOOT

FIGURE 52.—Graph of a 50-mile march, vehicles carrying normal loads plus a few riflemen on initial run to destination.

ference between operating a one lunger of 1898 and a straight eight of 1938. But new operating methods are by no means new tactics, nor are the new mechanical features nearly as significant as the change in weapons which a future adversary will have available to combat our tanks. When tank tactics were born, one side had all the tanks and the other side practically none. What a difference it will make to the tactical picture of the war of tomorrow when both sides fight with tanks. It is manifest even to a tyro that World War tactics will not suffice. Yet tank tactics still cling close to the pattern of 1918.

Today our Army has modernized tanks. And if another war should involve the United States, we must expect to meet an enemy equipped with similar machines. Not only will he have fast moving tanks, but highly mobile antitank guns as well. The most modern antitank weapons are of 1.0 to 2.0 inch caliber, carry frontal armor, and some guns are even mounted on caterpillar tractors. These are virtually destroyer tanks or tank chasers.

Yet, despite these additions to the materiel of potential enemies, we go serenely on practicing typical World War tank tactics. In problems and maneuvers the tanks, if not held in reserve, are forever attacking machine guns and zig-zagging to elude the fire of stationary antitank guns. Hostile tanks rarely are considered except when "we are defending", are seldom thought of in planning our tank operations, and never are "met" by our machines during their capers through Red positions. Never do we smack an enemy mechanized attack with our own ironclads—perhaps because ours lack effective antitank guns. And never do our tank attacks bump into smashing counterassaults made by the Reds' fast-moving, armored antitank guns or gun-toting tanks.

Yet how can such engagements be avoided when both belligerents are seeking to do the same thing with their armored forces?

For instance: One combatant using masses of tanks makes a deep penetration. The defender promptly counterattacks using tanks. The result is that in one area of

the battlefield we have great masses of armored vehicles. Is it to be expected that these tanks will pass one another by as they chase the elusive rifleman and machine gunner? And if these foot soldiers, meantime, duck into convenient foxholes, trenches, shell holes, or dougouts to avoid the iron-clad destroyers—will the opposing machines studiously avoid each other and scurry about aimlessly trying to ferret out the doughboys? Or will they go like terriers for the immediate menace to their own existence? There can be little question that dog will turn on dog to get a free field for hounding the cat.

At the outset of the World War, aerial dog fights were not dreamed of, but they soon began. Before long neither adversary could observe or reconnoiter extensively without first getting local air superiortity.

In the next war, ground combat vehicles will be in the same plight. Before they can attack machine-gun nests and rear-area installations they will have to elude or rub out the enemy antitank weapons—friendly artillery won't neutralize them all. And these weapons will include tanks, so tank fights are bound to be frequent. Even in 1918, when the enemy had only a handful of tanks, German and British tanks tangled on 24 April, 1918, at Villers-Bretonneux; and again on 8 October, 1918, in the vicinity of Forenville-Esnes. How much oftener will they meet in the next major war when both sides have thousands of combat vehicles? The tank fights in the Spanish civil war portend what would happen in a struggle between major powers. The major European armies recognize the enevitability of tank versus tank combat, and are training their tank units to meet hostile armored vehicles. There is very little of ostrich behavior in continental armies.

With all this before us, it is plain that a technique of tank versus tank combat must be developed by our own tank units. There being little historical data on how tanks fight tanks, it will be necessary to evolve fighting methods largely upon theory, experiment, and the inconclusive proving ground offered by peacetime maneuvers.

Heretofore there was nothing with which to test tank combat theories. Little could be learned of 20-mile-an-hour tactics with 4-mile-an-hour tanks. Now the entire wartime stock is on the shelf and new machines are at hand. With these, methods can and must be developed for engaging opposing tanks.

In map problems and terrain execises enemy tanks must be brought into the situation to oppose our tanks. In the combat training of tank units, there must be fights between individual tanks, tank platoons, and companies; eventually between battalions.

Enough facts should be derived from these sham ground fights and theoretical paper engagements to provide the formation for the new tactics of modern tanks.

Experience undoubtedly will show the need of different type tanks for different tasks, of special weapons in these tanks, and of more teamwork in the technique of using these machines.

When attacking, tanks will probably have to employ methods similar to those of foot troops or cavalry—or even more likely, of battleships. That is, a part of the tanks—possibly the destroyer tanks—will have to contain the hostile mechanized and antimechanized elements while the main tank effort is made at another point. Something will have to be done to divert or surprise the enemy in order to get around his antitank defense.

Similarly in defense, antitank and tank elements will work together to destroy attacking machines so that the friendly tanks can assist in the defeat of the attacking infantry. In either attack or defense, then, tanks will have to fight tanks.

When tanks learn to fight their own kind, tank tactics will graduate from the line-bucking methods of the past—which worked when the other side couldn't buck back—to the fast-moving, dodging, hitting, side-stepping methods that are in keeping with modern tanks and combat teams.

RADIO COMMUNICATION

Over a thousand radio sets were operated by the Italians during their Ethiopian campaign. Under such conditions coordination had to be excellent, which no doubt it was.

One fact must be remembered, however, lest the utility of radio be over-rated. The Ethiopian adversaries had an insignificant radio system, and it may be presumed that they intercepted very few Italian messages. Moreover, handicapped by extremely poor means of communication, no advantage could be taken of any hostile messages that might have been received. Hence, the Italians could use voice or plain telegraphic signals with impunity, and it is likely that they rarely bothered with time-consuming codes or cryptography.

Had they been fighting a modernly equipped force, they could not have used radio so freely, owing to the danger of interception. An example of what an intercepted message may do occurred during a maneuver last year. Instructions for making a withdrawal were sent from a Blue CP in clear (plain) text; that is, not encoded or encryptographed. Naturally there was one Red operator on the job who heard the news and tipped off his C.O. The Blue withdrawal, needless to say, was turned into a rout by the Reds.

The umpires' comments on Blue stupidity cannot be printed, but the rule that Blue leaders later had to memorize is significant and should be known by all military personnel: *All messages to be transmitted by radio are coded except when the commander or his authorized representative direct transmission in clear text.* This he may do when in his opinion—

1. The information contained is of no value to the enemy.
2. The information to be transmitted, if picked up by the enemy, cannot be acted upon in time to influence the situation.
3. The urgency of the message outweighs its value to the enemy.

Such messages will be marked "Send in clear" over the signature of the commander or his authorized representative.

CHAPTER 11

Technique of Fire 81-mm Mortar

(This chapter outlines a course in the technique of fire of the 81-mm mortar which has been used with success at The Infantry School. It is offered to the infantry at large with the idea that it may be of help in training in this subject until such time as an authorized course is promulgated by the War Department.—EDITOR)

SECTION I

GENERAL

1. *SCOPE.*—This chapter describes the technique necessary for the preparation and conduct of fire of the 81-mm mortar squad and platoon under the various conditions of combat. It does not contemplate the mortar company as a fire unit.

2. *PREPARATION AND CONDUCT OF FIRE.*—*a. Preparation of fire* is the determination of initial fire data. *Conduct of fire* is the technique of placing fire on a target. These two definitions include the following principal elements:

(1) *Preparation of fire.*—(a) Determination of initial direction of fire.

(b) Determination of initial range.

(c) Determination of distribution of fire.

(2) Conduct of fire.

(a) Fire commands.

(b) Sensing.

(c) Fire for adjustment.

(d) Fire for effect.

b. The exact technical methods to be used in the preparation and conduct of fire depend on such factors as the mission, observation, mortar positions, communication, and time available. These factors will vary greatly, so that no two situations will be identical. It follows that the technical methods must be used with initiative and judgement, as opposed to matters of drill, which must be adhered to rigidly. For example, the mechanics of laying the mortar are a matter of drill, whereas the correct method of placing fire on a given target is a matter of judgement. The most suitable method in any situation is usually the simplest method applicable.

c. Preparation of fire is either rapid or deliberate. Rapid preparation is used to secure approximate data when time is pressing or facilities limited. The errors in rapid preparation must be corrected by fire for adjustment. Deliberate preparation is used to secure accurate data when time and facilities are available. Deliberate preparation is mandatory when fire cannot be observed.

d. Conduct of fire may be classified with respect to observation, as:

(1) Axial conduct of fire.

(2) Liaison conduct of fire.

Conduct of fire is *axial* when the observer is on or near the line: mortar—target; i.e., when the shortest distance from the observer to that line is not more than one-tenth of the distance: observer—target. *Liaison* conduct of fire is applicable when the observer is a greater distance from the line: mortar—target than that described above or when he is not certain of this distance. Axial conduct of fire is the normal method in the mortar squad.

e. Preparation and conduct of fire are either by squad or by platoon. In the former, the fire is prepared and conducted by the squad leader (gun commander) as if acting alone. In the latter, the fire of one or both mortars is prepared and conducted by the platoon command-

er. The mortar company commander is responsible for the effective fire of his company and will supervise the platoon commanders in the preparation and conduct of fire. He will frequently assist the platoon commanders in these duties by the personnel and facilities of his company headquarters.

SECTION II

PREPARATION OF FIRE BY THE SQUAD

3. *GENERAL.—a.* Usually, in a situation requiring a squad leader to prepare firing data, there will be little time available for the purpose. Therefore, with only the squad equipment on hand the methods employed must be rapid and simple, and the resulting data will be an approximation. In order to facilitate the securing of such data (as well as the later conduct of fire) the observation post should be close enough to the mortar position to permit the squad leader (gun commander) to see both the target and the mortar position—at least its general location—and to transmit fire commands to the mortar crew by voice, or arm and hand signals.

b. The elements in the preparation of fire with which the squad leader will have to deal are:

(1) Determination of initial direction of fire.
(2) Determination of initial range.
(3) Determination of distribution of fire.

4. *DETERMINATION OF INITIAL DIRECTION OF FIRE.*—Since the mortar in nearly every situation is located in a defiladed position from which the gunner is unable to lay it directly on the target, the squad leader must first determine the direction of fire. The method by which he does this depends on whether the observation post in on the line: mortar—target, or is to the flank of this line.

a. Observation post on the line: mortar—target.—When the observation post is on the line: mortar—target,

the squad leader may determine the direction of fire by either of two ways. He may align aiming stakes directly on the line: mortar—target, or he may first determine the magnetic azimuth of that line and direct the gunner to align the stakes. These two methods are described as follows:

(1) *Direct alignment method.*—(a) This method is preferable when both the mortar and target can be seen from a point very near the mortar position (within about 50 yards). Under such conditions it is usually the simpler and more accurate method.

(b) The squad leader moves forward to a position from which he can see both the mortar position and the target. He places himself on the line: mortar—target and drives an aiming stake on this line. He then lays a second stake on top of the first, and using it as an alidade aligns the edge of it on the target. Without disturbing the position of this improvised alidade, and using the same edge, he then sights to the mortar position and directs that the base plate stake be driven on this line of sight to mark the location of the base plate. As soon as the base plate stake is driven he lines in a second aiming stake so that it is about 25 yards from the base plate. The mortar is then mounted and laid on the aiming stake.

(2) *Azimuth method.*—(a) This method is used when, due to the distance to the mask or obstacles, the alignment method cannot conveniently be used.

(b) The squad leader moves either to the front or to the rear to a point from which he can see both the mortar position and the target. He places himself on the line: mortar—target and with his lensatic compass reads the azimuth of this line. He then returns to the mortar position and directs the gunner to mount the mortar and lay on this azimuth.

b. Observation post to the flank of the line: mortar—target.—To determine the direction of fire when the observation post is to the flank of the line: mortar—target, the squad leader must first determine the azimuth of the

line: mortar—target, and then direct the gunner to mount and lay the mortar. The method of determining the azimuth of the line: mortar—target is known as the the *compass-and-mil* formula (Figure 53).

(1) *Compass-and-mil formula.*—(a) The squad leader, at the observation post, proceeds as follows:

(i) Reads the azimuth of the line: observer—target.

(ii) Estimates the distance: observer—target. And at the same time estimates the shortest distance from his position to the line: mortar—target.

(iii) Divides the latter distance by 1/1,000 of the distance: observer—target.

(iv) Corrects the azimuth read by adding or subtracting the quotient of the above division, to determine the azimuth on which the mortar should be laid. If the mortar is on the left of the observer he adds the quotient to the azimuth of the line: observer—target; if the mortar is on his right, he subtracts.

(b) The following example and discussion illustrates the *compass-and-mil* formula (Figure 53).

(i) *Example*: Azimuth O-T — 1,800 mils
Distance O-T — 1,000 yards
Shortest distance O to G-T — 100 yards

$$\frac{100}{1.0} = 100$$

Correcting the azimuth of 1,800 mils by adding (mortar on left) the 100 mils gives the azimuth mortar—target, 1,800 mils + 100 mils — 1,900 mils.

(ii) *Discussion.*—The observer *O* reads the azimuth O-T to be 1,800 mils, estimates the range O-T to be 1,000 yards and the distance O-G′ to be 100 yards. The azimuth GT will be identical to the azimuth OX (OX constructed parallel to GT). The correction necessary to be applied to azimuth, O-T is equivalent to the angle TOX. The value of angle TOX is unknown, but angle G′TO — angle TOX. (Alternate interior angles formed by a transversal cutting parallel lines are equal.) The value of angle G′TO can be determined by the mil formula $M = \frac{1{,}000W}{R}$. This

formula is simplified for rapid practical use by dividing both numerator and denominator of the fraction by 1,000. Then $M = \frac{W}{\frac{R}{1{,}000}}$. In this case W — G'O, and R — OT.

In Figure 53 the azimuth of line OX is greater than the

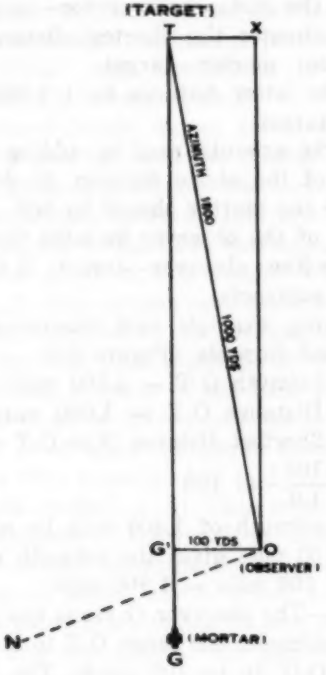


FIGURE 53.—Compass-and-mil-formula method.

azimuth of line OT. But since the lines OX and GT are parallel, the azimuth of line OX is the same as the azimuth of the line GT, the desired azimuth. Therefore the correction must be added. A convenient method for teaching observers to know quickly whether the correct-

ion should be added or subtracted is to use the word "LARS" (left add, right subtract); that is, if the mortar is on the left of the observer "add", if on the right of the observer "subtract" the correction.

5. *DETERMINATION OF RANGE.*—As soon as the direction of fire is determined, the squad leader determines the initial range to the target. To do this he uses the most efficient method available. However, since a range finder, map, or other means will rarely be available, he will usually have to depend on the method of estimation by eye.

6. *DETERMINATION OF DISTRIBUTION OF FIRE.*—Before engaging a target the squad leader must decide the distribution of fire required by the character of the target. A point target (for example, a definitely located machine gun) requires fixed fire. An area target (for example, an area in which machine guns are generally located) requires distribution of fire, usually both in width and depth. In the preparation of fire data for a point target the squad leader merely decides on the number of rounds required to destroy or neutralize the target. For an area target he determines the distribution as follows:

a. Distribution to cover an area: rule of thumb method.—For an area approximately 100 x 100 yards square the following rule of thumb will provide satisfactory distribution for all combat ranges:

(1) Three 25-yard range bounds will cover the depth of the area.

(2) Three rounds sweeping will cover the width of the area at each range bound.

(3) The number of turns of the traversing handwheel between each round which will give the proper interval between bursts is:

For ranges up to 1,000 yards.....3 turns
For ranges from 1,000 to 2,000 yards.....2 turns
For ranges over 2,000 yards.....1 turn

For areas which exceed 100 x 100 yards increase, in proportion to the size of the area, the number of range bounds and the number of rounds sweeping.

b. Discussion.—In order to compute *accurately* the fire distribution necessary to cover an area of definite width and depth the following procedure is necessary:

(1) Determine the width and depth of the area to be covered.

(2) Determine the number of 25-yard range bounds necessary to cover the area in depth.

(3) Determine the number of rounds sweeping required to cover the area in width.

(4) Multiply (2) by (3) to determine the total number of rounds required to cover the area once.

(5) Determine the number of turns of the traversing handwheel necessary after each round to make the proper interval between bursts, for example: To cover an area 50 yards wide and 100 yards deep at a range of 2,000 yards the computation is as follows:

(1) Area of target 50 yards wide by 100 yards deep.

(2) Number of 25-yard range bounds required equals the depth of the target (100 yards), divided by the number of yards in one range bound (25), with one range bound added to insure covering the entire target; i.e., $100 \div 25 = 4$, plus $1 = 5$ range bounds.

(3) Number of rounds to cover the width of the target at each bound equals the width of the area (50 yards) divided by the effective width of a single burst (25 yards) with one round added to insure covering the entire target; i.e., $50 \div 25 = 2$, plus $1 = 3$ rounds.

(4) Total number of rounds required to cover the area once (3×5) equals 15.

(5) The number of turns of the traversing handwheel between rounds equals the width in mils of a single burst at the range to the center of the target divided by 10 mils (the number of mils covered by a single turn of the traversing handwheel); or by solving the fraction $\frac{2500}{R}$.

in which R equals the range to the center of the target; i.e., 2500 divided by 2050 = 1¼ turns. Sufficient time will rarely be available to a squad leader for accurate computation and the rule of thumb given in the preceding paragraph is accurate enough for all practical purposes.

SECTION III

CONDUCT OF FIRE BY THE SQUAD

7. *GENERAL.—a.* The squad leader conducts the fire of the squad from an observation post which is on or close to the line: mortar—target, as described in paragraph 2 *d*, and at a distance from the mortar position which permits him to transmit fire commands to the mortar crew by voice or arm and hand signals.

b. The elements in the conduct of fire are:

(1) Fire commands.
(2) Sensing.
(3) Fire for adjustment.
(4) Fire for effect.

8. *FIRE COMMANDS.—a. General.*—(1) The squad leader causes his squad to open fire on a target, and controls the fire after it has been opened, by his fire commands. These commands contain the necessary data to enable the squad to lay the mortar correctly, to fire at the proper range and with the proper ammunition. The elements of a fire command are given in a definite sequence in order to accustom the squad to executing them in a definite routine. Whenever practicable, fire commands are given orally. When oral commands are not practicable, arm and hand signals or messages may be used. The elements of oral fire commands and the arm and hand signals are repeated by the gunner.

(2) Numbers are announced as illustrated in the fol-

lowing example:

10..... one zero
25..... two five
300..... three hundred
1,400.....one four hundred
2,000.....two thousand
1,925.....one nine two five
2,050.....two zero five zero
100.5.....one zero zero point five
254.4.....two five four point four.

(3) Fire is begun at the gunner's command *FIRE*, after he has received the last element of the squad leader's fire command. If the squad leader desires the mortar to be fired at his command, he includes the words *AT MY COMMAND* as the next to the last element of his fire command. This command continues in effect until revoked by the command *WITHOUT COMMAND* given in the same sequence in a succeeding command, or until the method of fire is changed. Fire is stopped by the squad leader's command *CEASE FIRING* or *SUSPEND FIRING*, but anyone present, in emergencies, may give the command *CEASE FIRING*. The command *SUSPEND FIRING* is used when a temporary stop is desired during the firing of a group of rounds. At this command the laying of the mortar is left unchanged. At the command *RESUME FIRING*, fire is resumed in accordance with the command as it existed at the time of the suspension of fire.

(4) Fire commands are classed as *initial fire commands* and *subsequent fire commands.*

b. Initial fire command.—(1) The initial fire command, which contains the data necessary to lay the mortar and fire the first round, includes the elements listed below in their correct sequence:

(a) Direction of fire.
(b) Type of shell.
(c) Fuze setting.

(d) Deflection setting.
(e) Aiming point.
(f) Number of rounds.
(g) Range (or elevation).

(2) The direction of fire is announced by the squad leader only in a situation in which he does not place the aiming stakes marking that direction but desires the gunner to perform this operation. In such a situation he announces *MAGNETIC AZIMUTH (SO MUCH)*, and waits until the aiming stakes have been properly placed by the mortar crew before announcing the succeeding elements of the fire command.

(3) The type of shell is announced as *HIGH EXPLOSIVE LIGHT (HEAVY)*, *PRACTICE*, or *SMOKE*.

(4) If the type of shell to be used has more than one fuze setting, the desired setting is announced: for example, *DELAY* or *SUPERQUICK*.

(5) If the initial direction of fire has been marked by aiming stakes, the deflection setting is zero and is announced as *SCALE 32, DRUM 100*. If the initial direction of fire is determined with reference to a base point the setting is announced as *BASE DEFLECTION RIGHT (LEFT) (SO MUCH)*.

(6) The aiming point is announced as *STAKE*, or *BASE* (or *OTHER*) *STAKE*, depending on the particular stake to be used.

(7) The number of rounds in an initial fire command is announced as *ONE ROUND*.

(8) The initial range to the target is announced as a number of yards ending with a multiple of 25 and without the words "range" and "yards", as for example, 1,600. The gunner sets the sight at the corresponding elevation shown on the range plate, interpolating if necessary. If a gunner's quadrant is to be used, the elevation in mils for the range is announced, for example, *QUADRANT 456*. The range or elevation is the last element of the initial fire command in the squad leader's command of exectuion for firing the mortar when laid.

(9) The following example shows how an initial fire command may be expressed in a situation in which the squad leader decides to have the mortar crew mark the direction of fire by aiming stakes on a magnetic azimuth of 1,400 and fire one round of light high explosive shell with a deflection setting of zero and a range setting of 1,000 yards:

MAGNETIC AZIMUTH 1,400
HIGH EXPLOSIVE, LIGHT
SUPERQUICK
SCALE 32, DRUM 100
STAKE
ONE ROUND
1,000.

c. Subsequent fire commands.—(1) Subsequent fire commands contain the data sufficient to complete fire for adjustment and to produce fire for effect. The elements, listed in their correct sequence, are as follows:

(a) Completion of fire for adjustment.
(i) Deflection correction.
(ii) Range (or elevation).
(b) Fire for effect on a point target.
(i) Deflection correction.
(ii) Number of rounds (method of fire).
(iii) Range (or elevation).
(c) Fire for effect on an area target.
(i) Deflection correction.
(ii) Number of rounds sweeping (method of fire).
(iii) Range (or elevation) limits.

(2) In subsequent fire commands the range (or elevation), being the squad leader's command of execution, is always announced. Only such other elements as differ from the initial fire command are announced.

(3) (a) If any round fails to fall on the line observer—target, during fire for adjustment, the squad leader orders a deflection correction to be set on the sight which will place the next burst on that line. The correction is

announced in the sequence: direction and number of mils, as for example, *RIGHT (LEFT) 10.* If no correction of deflection is required this element is omitted.

(b) Since the number of rounds for each firing in fire for adjustment is unchanged, this element is omitted.

(c) The range or elevation in fire for adjustment is announced as described in *b* (8), above. Whether it is different from that used for the preceding firing or not, it is always announced.

(4) (a) In fire for effect on a point target, a deflection correction is announced (as in (3) (a)) only if the succeeding rounds are to be fired at a deflection different from that at which the preceding round or rounds were fired.

(b) Fire for effect on a point target is fired by groups of rounds. A group usually is five rounds, each round being fired at the command of the gunner as rapidly as accuracy in laying the mortar permits. The element therefore is a method of fire and is called *volley fire.* The squad leader announces the number of rounds for the initial group as, for example, *FIVE ROUNDS,* but omits the element for each succeeding group, unless a change in the number of rounds is decided. If all the first group of rounds fired for effect fall over or short of the target, the squad leader will correct the range by decreasing or increasing the sight-setting by 25 yards to bring the center of impact on the target, and will fire another group of five rounds.

(c) The initial range (or elevation) used in fire for effect on a point target is determined by fire for adjustment. It may or may not be changed for firing each subsequent group of rounds. In any event it is always announced.

(5) (a) In fire for effect on an area target it is frequently necessary for the squad leader to announce a deflection correction in order to shift the direction of the mortar from the adjusting point to the edge of the target upon which it is desired to commence fire for effect.

If fire for adjustment is completed on the edge of the target at which it is desired to commence fire for effect, no deflection correction is announced.

(b) The purpose of sweeping fire or the method of fire, called *volley fire, sweeping* is to cover an area target in width by changing the direction of the mortar between rounds (paragraph 6). The command for distributing fire as described in paragraph 6 *a* is *3 ROUNDS, SWEEPING, LEFT (RIGHT) 3 (2 or 1) TURNS.* Fire is opened and executed as prescribed in (4) (b), above, except that after each round the gunner traverses the mortar the number of turns of the handwheel specified in the command. When the last round of the sweep has been fired, the gunner changes to the next elevation announced by the squad leader and traverses in the opposite direction. The command for distributing fire as described in paragraph 6 *b* is *(SO MANY) ROUNDS, SWEEPING, LEFT (RIGHT) (SO MANY) TURNS.*

(c) Fire for effect is distributed over an area target in depth by firing a number of ranges in a definite sequence (paragraph 6). The command given by the squad leader is: *ZONE,* followed by the limiting ranges, as, for example: *ZONE, 1,600—1,650.* The gunner fires at ranges differing by 25 yards, beginning with the first range announced by the squad leader. In the example above the ranges fired upon are: 1,600, 1,625, 1,650. The command for fire by the method described in paragraph 6 *b* is similar to the example above, except that the limiting ranges are such as to include all of the ranges to be fired upon.

(6) The elements of a subsequent fire command may be expressed as follows:

(a) *Point target.*—(i) Completion of fire for adjustment.

LEFT 50
1,200

(ii) Fire for effect.

FIVE ROUNDS
1,225

(b) *Area target.*—(i) Completion of fire for adjustment.

RIGHT 10
1,550

(ii) Fire for effect.

LEFT 50
3 ROUNDS SWEEPING, RIGHT
2 TURNS
ZONE, 1,500—1,550.

d. Arm and hand signals.—(1) Arm and hand signals are used by the squad leader to transmit simple changes in fire data when distances are so great as to make direct oral commands difficult. Since the elements of initial fire commands and fire for effect on area targets are not easily transmissible by arm and hand signals, they are usually transmitted by voice or message. Arm and hand signals are given by the squad leader while facing towards the mortar position. Deflection signals are given in the direction towards which the correction is to be taken without regard to which arm is used. The order to fire is understood at the completion of a series of signals.

(2) The general arm and hand signals used are as prescribed in T.R. 420-40. However, a few additional signals used in mortar firing are given below.

(a) The first signal in any series is, "Are you ready?"

(b) The signal for changes in deflection is begun from a position with the arm and hand horizontal, fingers extended and joined and palm down and in the direction toward which the change is to be made. For each change of 10 mils the hand is brought to the shoulder and returned to its starting position. For each change of 1 mil the arm is raised and returned to the starting position through an angle of about 45 degrees. When the signal for a deflection change is completed, the arm is dropped directly to the side.

(3) The signal for change in range is as follows: For each 25-yard increase the fist is thrust upward vertically

from the shoulder to the full extent of the arm and returned. For each 25-yard decrease the fist is thrust downward and returned in a similar manner.

(4) To signal for fire for effect on a point target or *FIVE ROUNDS*, clasp both hands above the head, arms fully extended, and then signal the change in range, if any.

9. *SENSING.—a. General.*—(1) Sensing is the ability of the observer to determine from observation of the burst of a projectile, or from observation of the terrain, or of dust or other disturbances caused by the projectile's fall, whether the point of strike is right or left, over or short of the target. If the strike of the projectile is visible, but its location is not sufficiently definite for the observer to be sure that it is over or short, right or left of the target, the round is sensed as "doubtful", either for range or deflection or both. If the observer sees no indication of the strike of the projectile, the round is sensed as "lost". Unless the observer can sense accurately, he cannot make prompt and effective adjustment of fire. He must never announce that a burst is over or short, or right or left of the target unless he is sure of that fact. If he is not sure he should sense the round as "doubtful".

(2) A sensing should be made promptly, except when a short delay is advisable in order to take advantage of drifting smoke after a burst. The squad leader should base his sensing *on what he sees while it is before his eyes*, and not on his recollections.

(3) Positive sensings for range and deflection usually are made on bursts in line with the target. They may be made when the bursts are not in line with the target if the terrain is such as to leave no doubt as to the location of the burst with respect to the target; for example, when the target is on a positive slope or when the observation post is above the target area. Also, under some conditions, drifting smoke from the burst may permit a positive sensing. When an observer senses a burst from

a round fired, he determines the deflection error; i.e., how many mils the burst is to the right or left of the target and whether it is an "over" or a "short"; i.e., whether the burst is beyond or short of the target. He may be able to sense the round for deflection but not for range, in which case another round should be fired with the deflection correction applied and with the same range as the preceding round.

(4) Ability to sense rapidly may be developed by accustoming the observer to announce his sensing of each round as promptly as observation will permit.

(5) The observer must study the terrain in the vicinity of the target to locate ravines or hollows which may hide bursts. He must note particularly the direction of the wind. Smoke from hidden bursts may appear later and may cause erroneous sensings.

(6) In the mortar squad the squad leader normally performs the duties of observer.

b. Axial method of sensing.—(1) *Observer on the line: mortar—target.*—(a) The best position for the observer is at the mortar position. From this position his deflection sensing and the deflection correction to be made on the sight are the same. He can also exercise better control over the mortar squad when at the mortar position.

(b) Next to the mortar position, the best place for the observer is in front or rear of the mortar position and on the line: mortar—target. However, from such a position his deflection sensing is not the same as the deflection to be set off on the mortar. If he is in rear of the mortar the deflection sensing will be less than the deflection to be set off on the mortar; if he is in front of the mortar the deflection sensing will be greater than the deflection to be set off on the mortar. (See Figure 54.) By practice the observer is able to determine the proper allowance to make. If he is halfway between the mortar and target his deflection sensing will be twice the correction to be made on the sight; if the mortar is halfway between the observer and the target his deflection sensing will be half the correction to be made on the sight; other

distances will give other ratios. However, the observer will usually be close enough to the mortar position to obviate the necessity of a correction for the distance of the observer from the mortar.

(2) *Observer to the flank.*—It may be necessary for

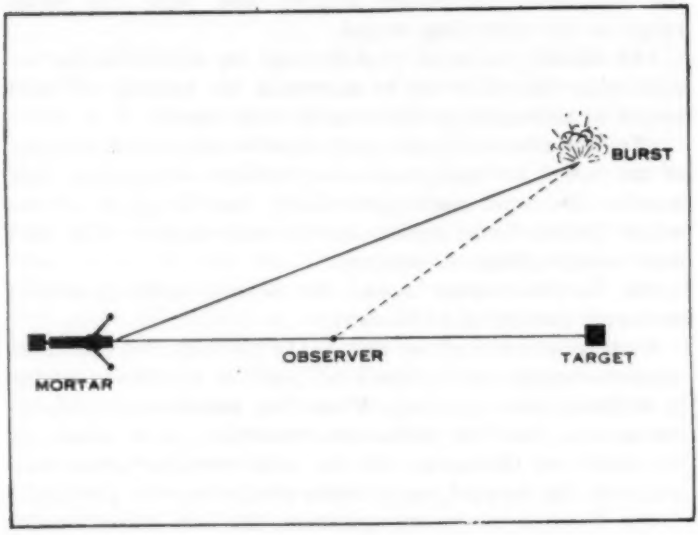


FIGURE 54.—Deflection sensing.

the observer to take a position to the flank, to the flank and forward, or to the flank and rear of the mortar position.

(a) In each of these cases there will be an additional error due to the fact that the deflection sensing varies as the observer moves to the right or left; that is, the positions of the target and the point of impact with relation to each other seem to change as the observer changes his position.

Example.—In Figure 55 the observer at A reads the actual deflection which should be set off on the sight. If

he moves to B he sees the burst as if it were directly in line with the target; a correction for deflection is apparently unnecessary. If he moves to C he reads a deflection that is much greater than the correction to be set off on the sight. No formula has been devised which is

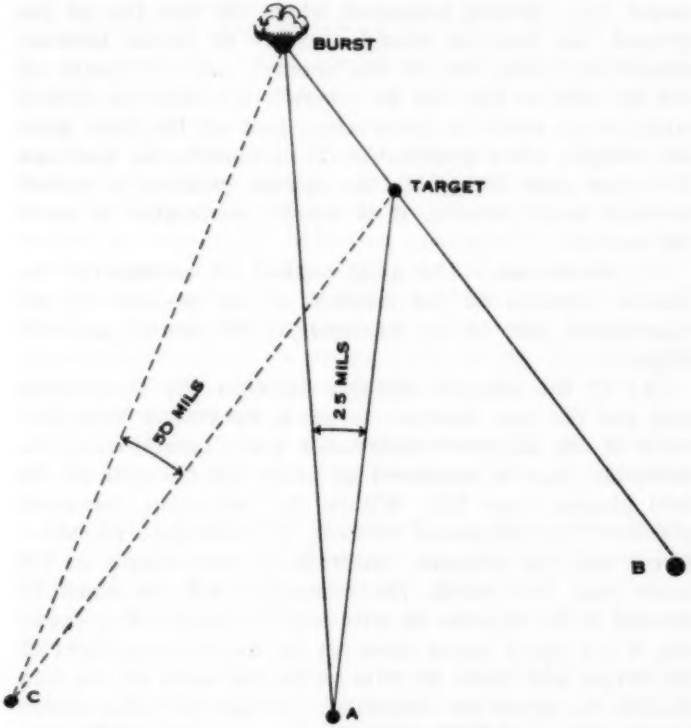


FIGURE 55.—Deflection sensings from flank positions.

convenient for use in the field by the squad leader. The method described in the discussion requires some calculation, but gives accurate results.

(b) Upon taking a position off the line: mortar—tar-

get the observer should at once estimate where the line: mortar—target lies on the ground and read the deflection from this line to the bursts. As bursts having errors in range will appear to be to the right or left of the target, the observer should also estimate where a line perpendicular to the line: mortar—target and passing through the target lies. Having estimated where the line lies on the ground, the observer should consider all bursts between himself and this line to be "shorts", and all bursts on the far side of the line as "overs". An observer should endeavor to avoid an observation post off the line: mortar—target, when practicable. If no observation post can be found close enough to the mortar position to permit accurate axial sensing, it is usually preferable to move the mortar.

(3) *Discussion.*—The axial method of sensing for deflection depends on the relation of the position of the observation post to the locations of the mortar and the targets.

(a) If the shortest distance between the observation post and the line: mortar—target is no greater than one-tenth of the distance: observation post—target, errors in deflection may be measured by using the mil-scale in the field glasses, type EE. Within the limitation, described above, if the difference between the distance: mortar—target and the distance: observation post—target is not more than 100 yards, the correction will be equal in amount to the number of mils read or sensed. For example, if the squad leader observes the bursts to be right of the target and reads 30 mils on the mil-scale of his field glasses, he senses for deflection: "30 RIGHT" and orders a correction: "LEFT 30". If, however, the difference between the distance: observation post—target and the distance: mortar—target is greater than 100 yards, he applies a factor to the number of mils sensed before ordering the correction. This factor is a fraction the numerator of which is the distance: observation post

—target and the denominator, the distance: mortar—target; i.e., $\frac{\text{distance, observation post—target}}{\text{distance, mortar—target}}$.

For example, if the distance: observation post—target is 600 yards, the distance: mortar—target is 800 yards, and the deflection read by the observer is 40 mils, the correction ordered is: $\frac{600}{800}$ (or 3/4) x 40 mils = 30 mils.

In applying this factor, simplicity and speed should be sought. Therefore, distances used should be to the nearest even 100 yards.

(b) If the shortest distance between the observation post and the line: mortar—target is greater than one-tenth of the distance: observation post—target, the liaison method of sensing for deflection (paragraph 29) is used.

(4) *Range.*—(a) The axial method of sensing for range is that used in the bracketing method of adjustment. In this method the squad leader does not attempt to measure the errors in range, but simply senses each burst as "over", "short", "doubtful", or "lost", as described in paragraph 10.

(b) If observation is not axial—as in (3) (b) above—the liaison method of sensing for range (par. 29) is used.

10. *FIRE FOR ADJUSTMENT.*—*a.* Fire for adjustment precedes fire for effect and has for its purpose the determination from the observed relation of the bursts and the target the data necessary to place the fire on the target.

b. In fire for adjustment, range is adjusted by bracketing. The target is kept between two ranges, one increasing and the other decreasing, until the center of impact is on or near the target. A target is said to be bracketed for range when one "short" and one "over" have been obtained. The range to the target is estimated as accurately as possible (paragraph 5) and a round is fired with this setting. If the burst is observed to be an "over" the range setting is decreased 200 yards and another round fired with this new setting. If this round is a "short",

the third round is fired with a range setting which is the mean or average of the two previous range settings. Subsequent rounds are fired with range settings which are the mean of the last "short" and the last "over". If the first burst is a "short" the range setting is increased 200 yards and another round is fired. Subsequent rounds are fired with range settings which are the mean of the last "short" and the last "over". The actual distance from the target of the "short" or "over" is immaterial, and need not be estimated or considered by the observer. After the bracket is obtained the range is increased or decreased in steps of 100, 50, and 25 yards, according to the desired size of the final bracket (subparagraph *f*, below).

c. The following example illustrates the procedure in fire for adjustment of range as described in *b* above. The range to the target is estimated to be 1,100 yards and the first round is fired with this setting. The burst is observed to be a "short". The range setting is increased 200 yards and the next round is fired with a setting of 1,300. The burst is observed to be an "over". The bracket is now established. The range setting for the third round is the mean of the "short" (1,100) and "over" (1,300) and is fired with a setting of 1,200. The third round is observed to be an "over". The fourth round is fired with a setting of 1,150, which is the mean of the last "short" (1,100) and the last "over" (1,200). The fourth burst is observed to be a "short". The range for the fifth round is 1,175 which is the mean of the last "short" (1,150) and the last "over" (1,200). The fifth round bursts on the target. This may be verified by one additional round and fire for effect opened, or fire for effect may be opened without a verifying round.

d. Experience has proved that the bracketing method is the quickest and most economical method of adjusting fire. Attempts to estimate the distance between a burst and the target and to bring the next burst on the target are seldom successful, due to the inability of observers to estimate accurately the distance between two points

on the line: mortar—target. The bracketing method eliminates the necessity of doing this. The observer need merely determine whether a burst is a "short", or an "over", The method is applicable to practically all situations. Even when firing at a target on the crest of a hill the "shorts" can be observed and all unobserved bursts are treated as "overs".

e. During fire for adjustment of range it is necessary to adjust deflection as nearly as possible in order to be able to sense accurately for range. Therefore, for each round which does not burst on the line: observer—target, the deflection to the right or left of this line is measured and a corresponding correction applied for the succeeding round. For instance, in the example in *c* above, if the initial round which is fired at a range of 1,100 yards bursts 30 mils to the right of the line: observer—target, it may be impossible to determine whether it is "short" or "over". In such a case the squad leader orders the next round fired at a deffection of left 30 mils so that he may be able to sense for range.

f. The extent to which adjustment of fire is carried depends on the nature of the target and time available. For a stationary point target (except one which requires the heavy shell) the adjustment is completed when it is included in a 25-yard bracket. For a point target requiring the heavy shell, the adjustment is continued until the 25-yard bracket is split. It may be commenced with the light shell, the heavy shell being used when a 25-yard bracket is reached. The adjustment on an area target is usually completed when a point with reference to the area is included within a 50-yard bracket. This point may be within the area or outside of it. If the point is outside the area it should be at about the same range as the area and not more than 100 mils in deflection to the side of it.

11. *FIRE FOR EFFECT.—a.* The purpose of fire for effect is to keep fire on the target until the desired result is accomplished. Fire for effect on a point target is fixed fire begun at a range determined by fire for adjustment.

The range to commence fire for effect is the limit of the final bracket in fire for adjustment (25-yards), which appears the closer to the target. Fire for effect on an area target is distributed fire. If the point on which the fire has been adjusted, is in the part of the area at which it is desired to begin fire for effect, the range to commence fire for effect is the limit of the final bracket in fire for adjustment (50 yards) which appears the closer to this point. If the point on which the fire has been adjusted is not on the part of the target at which it is desired to begin fire for effect, a shift in range or deflection or both is first necessary.

b. Fire for effect on an area target usually requires distribution of fire in both width and depth (paragraph 6). Distribution of fire in depth is accomplished by firing through the area in range bounds of 25 yards, beginning at the near or far range limit of the area and ending at the opposite range limit. Distribution of fire in width, if the area is too wide to be covered by a single round (greater than about 25 yards in width), is accomplished by firing a number of rounds from one side of the area to the other at each range bound and at an interval of the width of a single burst (paragraph 6 *a* and *b*). For fire for effect on an area target the squad leader in his fire commands announces the number of rounds sweeping, the initial direction and number of turns of the traversing wheel between rounds, and the range limits of the area, for example:

3 ROUNDS SWEEPING, LEFT (RIGHT), 2 TURNS ZONE, 1,600, 1,650

Firing is commenced at the first range limit announced or at a range of 1,600. The next range fired is 1,625, and the last 1,650. If it is desired to cover the area again the squad leader announces: *ZONE, 1650, 1600,* and the above ranges are fired in the reverse order. At each range three rounds are fired. At the initial range the first round is fired on the right (or left) edge of the

target, the second 2 turns to the left (right) of the first, and the last 2 turns to the left (right) of the second. The first round fired at each succeeding range bound is fired at the same deflection as the third round of its preceding range bound. (Figure 56.)

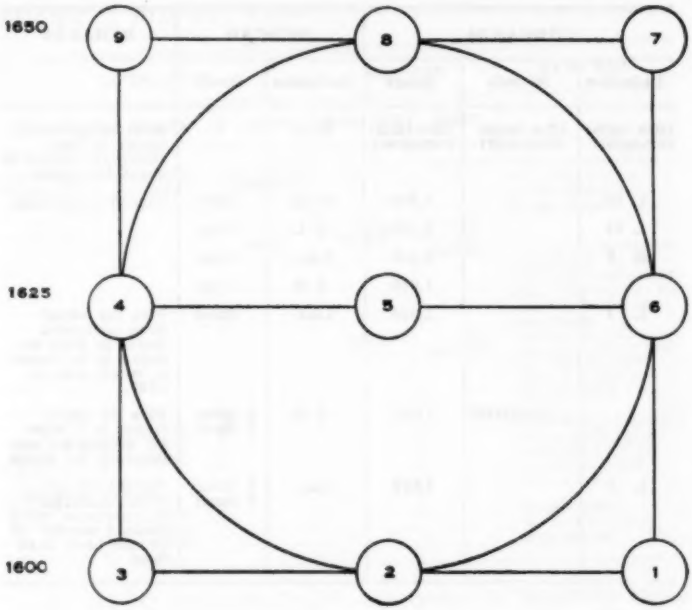


FIGURE 56.—Method of distribution.

12. *TYPE PROBLEMS.*—The following type problems illustrate the procedure in the axial conduct of fire of the squad.

a. Type problem for fire on a point target.—

TYPE PROBLEM, FIRE ON POINT TARGET

Initial command: *H. E. LIGHT, SCALE 32 DRUM 100, BASE STAKE, ONE ROUND, 1,000.*

COMMANDS			SENSING		REMARKS
Deflection	Rounds	Range	Deflection	Range	
(See initial command)	(See initial command)	(See initial command)	50 R	?	Must bring burst closer to line: observer—target to sense for range.
L 50		1,000	10 R	Short	Sensed on terrain.
L 10		1,200	5 L	Over	
R 5		1,100	Line	Over	
		1,050	3 R	Over	
L 3		1,025	Line	Short	Fire for adjustment completed. Burst at 1050 appears to be closer to target than at 1025.
	5 ROUNDS	1,050	5 R	2 Over 3 Short	Fire for effect. Group is 5 right for deflection; satisfactory for range.
L 5		1,050	Line	2 Over 2 Short	"MISSION ACCOMPLISHED" is announced when desired number of rounds have been fired.

b. Type problem, area fire by single mortar.—Target is approximately 100 × 100 yards and the rule of thumb method of distribution (par. 6*a*) is used.

TYPE PROBLEM, AREA FIRE BY SINGLE MORTAR

Initial command: *H. E. LIGHT, SCALE 82 DRUM ZERO, STAKE, 1 ROUND, 1,500.*

COMMANDS			SENSING		REMARKS
Deflection	Rounds	Range	Deflection	Range	
(See initial command)	(See initial command)	(See initial command)	20 R	SHORT	The adjustment in this case is on a point outside the target area.
L 20		1,700	5 R	OVER	
L 5		1,600	LINE	OVER	
		1,550	5 L	SHORT	Fire for adjustment completed. 1550 appears to be closer than 1600 and fire for effect is based on this range.
			70 R	100 SHORT	Amount of shift sensed to begin fire for effect at right edge of target and on near limit.
L 70 3 ROUNDS SWEEPING, LEFT 2 TURNS	ZONE 1,650 1,700				Command for fire for effect. (Will call for expenditure of 20 rounds to cover area once.)
	ZONE 1,700-1,650				Squad leader desires to cover area again.

13. *BASE DEFLECTION.*—In order to facilitate rapid adjustment on new targets it is necessary to establish an origin of shift as early as possible. Adjusted data to this point is necessary for accuracy. This origin of shift for the squad will usually be the first target engaged, however it may be any clearly-defined point in the target area. It is called the *base point.* The deflection of the base point is termed *base deflection.* Base deflection is marked on the ground as soon as adjustment is completed upon the base point or, in case the base point is the initial target, as soon as fire for effect on the target is completed (so as not to interfere with this fire). At

the command of the squad leader, "MARK BASE DEFLECTION" which is given after the last round on that point is fired and the axis of the bore of the mortar has the correct deflection, the gunner, without disturbing the laying of the mortar, sets his sight at zero deflection (scale 32, drum 100) and directs two aiming stakes be placed on the line of sight. Since base deflection is now marked by these stakes the original aiming stakes are removed to prevent confusion.

14. *DIRECT LAYING.*—Since the mortar is usually located in defiladed positions it will rarely be possible to lay directly on the target. There may be situations, however, where no defilade is available or where speed in destroying a target is more essential than cover. Usually such a position will be a temporary one and will be evacuated as soon as the target is destroyed. In such a situation the squad leader will point out the target or its direction to the gunner and direct that the mortar be mounted immediately and without stakes (either baseplate or aiming). If the target is indistinct and the squad leader has indicated only its direction, he will lay the mortar himself as soon as it is mounted. The mortar is laid and fired in the same manner as described for indirect laying, except that one clearly-defined edge or point of the target should be used as the aiming point. If it is apparent that the bursts may obscure the target from observation, any suitable aiming point in the target area may be used. Its deflection should be measured by the squad leader from near the mortar and announced as initial deflection.

15. *OVERHEAD FIRE.—a. General.*—Since the mortar is a high-angle fire weapon, there is little danger to friendly troops from mortar fire directed over their heads upon distant targets. The danger then, to troops located between the mortar and its target, lies in the nearness of these troops to the impact area. Therefore, when firing close to friendly troops, firing should be opened with a

range which is manifestly over. Subsequent changes in range should be made to insure that the shells do not burst short of the target.

b. Creeping method.—In a situation requiring fire close to friendly troops, the bracketing method cannot be used. The method to be employed is called "The creeping method". The procedure is as follows: The observer estimates the range to the target, adds 200 yards for safety, and calls for the first round at this increased range. He estimates the distance of the burst from the target, and deducts one-half of this error in range from the previous range setting for the next round. This procedure is followed until the point of impact is brought on or within effective bursting radius of the target. This method may be illustrated as follows: The observer estimates the range to the target to be 1,000 yards and calls for the first round at a range of 1,200 yards. If his estimation is correct the burst is 200 yards over. The next round is fired at 1,100 yards and so on until the burst strikes the target or the target is included in the effective bursting radius of the type of shell employed.

c. General safety rule.—Mortar fire should be at least 100 yards from friendly troops.

16. *NIGHT FIRING.—a. Laying.*—The 81-mm mortar may be required to fire at night. In such cases an aiming stake with a night-firing device attached is set up and used as an aiming point for all laying. If the position has been occupied during the daytime and fire has been adjusted on a base point or other point and stakes placed out, the nearer stake is equipped with the night-firing device. Data is determined and recorded during the daytime providing for a shift from this stake to any targets at which it may be desired to fire at night. To lay at night on these targets the gunner sets off on his sight the recorded shifts in deflection and range and lays on the night aiming stake. The best method of recording this data for night firing is for the gunner to prepare a table similar to the one shown in Figure 63, which gives the

range and the target's deflection from the aiming point. If the mortar position is to be occupied at night and no daylight reconnaissance has been practicable, any night firing that is done must be based on data computed from an aerial photograph or map. Such data is only as accurate as the aerial photograph or map available.

b. Night-firing device.—Night-firing devices may be improvised. For example: In the end of a tin can cut a cross-shaped slit and cover it with a thin white cloth to keep the glare out of the gunner's eyes; or remove the lid of the can, mark a heavy black cross on a sheet of paper, and fasten it over the open end. Punch several holes in the other end of the can. In one side of the can cut a rough cross-shaped slit and bend its edges inward to admit and hold a candle. Punch several nail holes above and on each side of the point where the flame of the candle will be. Insert a lighted candle in the can and attach the latter to the aiming stake. A flashlight may be used instead of a candle for illumination.

17. *FIRING WITHOUT SIGHTS.*—The mortar is not rendered useless because of loss or destruction of the sight or the sight bracket.

a. Direction.—The mortar may be laid in direction on a stake or other aiming point by aligning either the right or left edge of the barrel on the aiming point in a manner similar to laying with the vertical line in the collimator. Subsequent changes in deflection can be made with the traversing handwheel. One turn of the traversing handwheel is equal, approximately to a 10-mil change in deflection.

b. Elevation.—To lay the mortar in elevation without the sight, the angle of the barrel with the horizontal must be made to correspond with the angle of elevation designated on the range plate opposite the desired range. The most accurate method of setting off this angle (without the sight) is with the gunner's quadrant. Otherwise the correct angle of the barrel must be judged by eye for the initial shot. It will greatly assist the gunner in estimat-

ing this angle if his assistant holds a plumb bob (may be improvised) directly over the center of the base cap of the mortar. The desired angle of the barrel with the vertical (or string of the plumb bob) will be 90 degrees minus the angle of elevation. Subsequent changes in elevation may be made by using the elevating crank. One turn of the elevating crank is approximately equal to 30 minutes (½ degree). Subsequent changes in elevation may be obtained by converting yards to degrees, using the range plate on yoke of mortar, and then by converting the degrees to turns of the elevating crank.

SECTION IV

PREPARATION OF FIRE BY THE PLATOON

18. *GENERAL.—a.* The accuracy of preparation of fire data by the platoon depends on the time and equipment available. The platoon commander may have accurate means of determining direction, angles and ranges, by use of an aiming circle, range finder, and sketching equipment. He may also possess a map or aerial photograph. Usually, his observation post will be close enough to the mortar positions to permit the transmission of commands to the gun commanders by word of mouth or by arm-and-hand signals. At times, however, the observation post will be at such a distance that the platoon commander will not be able to see the mortar positions and will have to use telephone or radio communication. In such situations the methods of preparing data will differ from those prescribed for the squad.

b. Before commencing the preparation of fire data the platoon commander designates one of the mortars, usually the right mortar, as *base mortar* and selects a clearly-defined point in the target area, frequently the initial target, as a *base point.* The initial fire data are first prepared for the base mortar. Both mortars are mounted and initially laid parallel with this data. The base point

serves later as an adjusting point for fire, and helps to determine the direction of subsequent targets.

19. *DETERMINATION OF INITIAL DIRECTION OF FIRE AND RANGE.*—When time is pressing and the observation post is so located that both the base point and base mortar are visible, the platoon commander may determine the initial direction of fire by any of the squad methods applicable—namely, the direct alignment, azimuth, or compass-and-mil formula methods (paragraph 4)—and determine the initial range by the most efficient method practicable, which is usually estimation by eye. If, however, sufficient time is available for more deliberate preparation—or the relation of the observation post, base point and base mortar is such as to make the squad methods inapplicable—one of the following *survey methods, the aerial photograph method,* or the *map method* may be used.

a. Survey method, using one station.—(1) This method is used when the location of the base mortar and base point are both visible from one point. Although this point is usually the observation post, it need not be.

(2) The platoon commander assisted by such personnel as necessary performs the following operations:

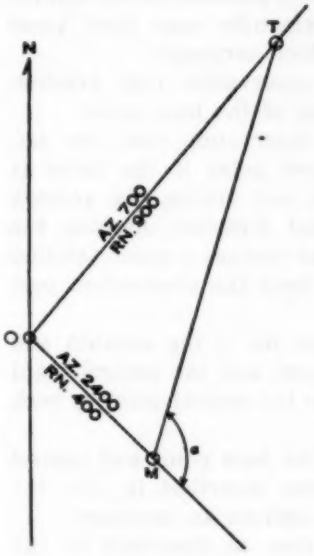
(a) Measures from the observation post or other point as described in (1) above, the magnetic azimuth of the base point and the base mortar position. For these measurements he uses a lensatic compass or, if available, an aiming circle.

(b) Measures from the same point the distances to the base point and base mortar position. In making these measurements he uses the most accurate means available and practicable such as tape, pacing, map or aerial photograph, range finder, reports, estimates.

(c) Plots on paper the data secured in (a) and (b) and obtains the initial azimuth and range of the line: base mortar—base point as described in Figure 57.

b. Survey method, using one or more stations and a control point.—(1) This method is used when the location

of both the base mortar position and base point are not visible from one point and it is necessary to use one or more stations and a control point in the survey to de-



1. Draw an arbitrary line conveniently located on paper to facilitate plotting. This line (O-N) represents direction of magnetic north.
2. On this line plot point "O" at any desired position. This represents the position of the observer (observation post or other point from which readings were taken).
3. With the index of the protractor at "O" and the diameter line coincident with line O-N, draw a ray representing the azimuth to base point (700) and a ray representing the azimuth to base mortar (2400).
4. Using any convenient scale, measure on the respective rays drawn in 3, the distance to base point and base mortar (900 yards and 400 yards).
5. Plot the positions of T (base point) and M (base mortar).
6. Draw a line connecting T and M.
7. Using the same scale as in 4, measure the line M-T to obtain the range: base mortar-base point (1030 yards).
8. With the index of the protractor on point M and the diameter line coincident with the line M-T, measure the angle a (2,100) subtract the amount of this angle from the azimuth read to base mortar (2400) to obtain the azimuth of the line base mortar—base point (M-T). (2,400 — 2,100 = 300).

	AZIMUTH	RANGE
O. P. TO MORTAR	2400	400
O. P. TO T.	700	900

FIGURE 57.—Plotting for survey using one station.

termine the initial azimuth and range of the line: base mortar—base point.

(2) Before proceeding to collect data the platoon commander selects a terrain feature for use as a *control point* which is easily visible from the base mortar position

and most likely to be visible from the observation post. Then assisted by such personnel as is necessary he obtains data as follows:

(a) He measures from the base mortar position the magnetic azimuth and distance of the control point, using the means described in sub-paragraph *a* (2) of this paragraph. If time is pressing and the distance to the control point is short, the platoon commander may have these measurements made by the platoon sergeant.

(b) He measures from the observation post (station No. 1) the azimuth and distance of the base point.

(c) He measures from the observation post the azimuth and distance to the control point if the latter is visible. If the control point is not visible, the platoon commander moves in its general direction, keeping the observation post in view, until he reaches a point (station No. 2) from which he can see both the observation post and the control point.

(d) He measures from station No. 2 the azimuth and range to both the observation post and the control point and converts the azimuth read to the control point to back azimuth.

(e) The traverse connecting the base point and control point is completed in the manner described in (b) (c) and (d) above, using as many stations as necessary.

(3) After completing the survey as described in (2) above, the platoon commander plots the data on a piece of paper and determines the initial direction and range of the line: base mortar—base point as follows: (See Figure 58.)

(a) He draws an arbitrary line conveniently located on paper to facilitate plotting. This line (*M-N*) represents the direction of magnetic north.

(b) On this line he plots the point *M* (base mortar position) at any desired position.

(c) With the index of the protractor at *M* and the diameter line coincident with the line *M-N* he draws a ray on the azimuth read to the control point (1,800). Using any convenient scale, he measures on this ray the

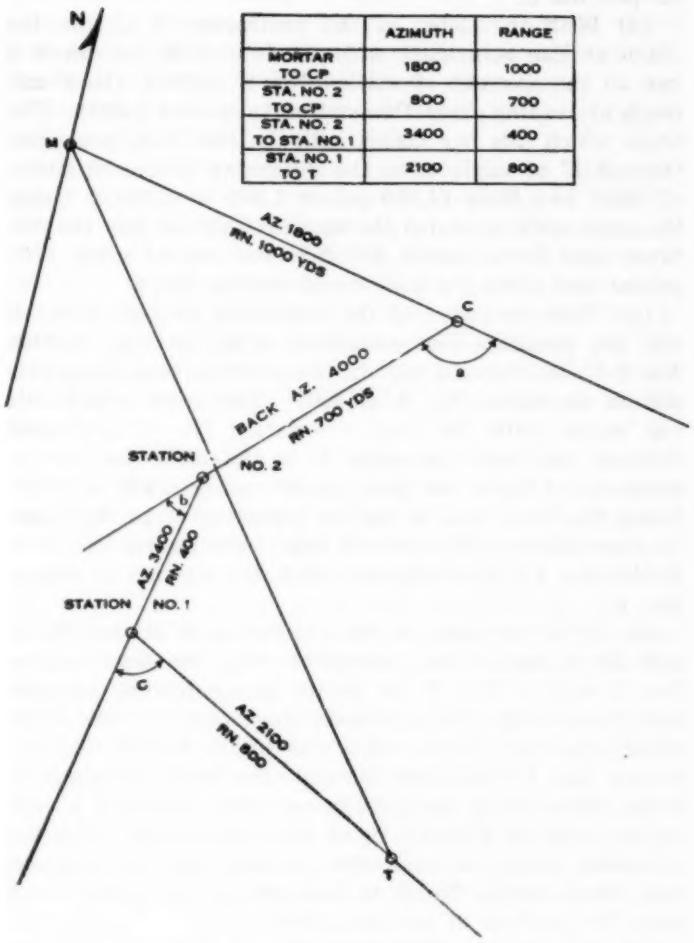


FIGURE 58.—Plotting for survey using one or more stations and a control point.

distance read to the control point (1,000 yards) and plots its position *C*.

(d) With the index of the protractor at *C* and the diameter line coincident with the line: *C-M* he draws a ray on the azimuth of station No. 2 (4,000) (back azimuth of reading from this station to control point). The angle which this ray makes with the line *C-M*, prolonged through *C* or angle *a*, is the difference of the azimuths of these two lines (4,000 minus 1,800 — 2,200). Using the same scale as in (c), he measures on this ray the distance read from station No. 2 to the control point (700 yards) and plots the position of station No. 2.

(e) With the index of the protractor at station No. 2 and the diameter line coincident with the line: station No. 2 *C*, he draws a ray on the azimuth read from this station to station No. 1 (3,400). The angle which this ray makes with the line: *C*—station No. 2, prolonged through the latter or angle *b*, is the difference of the azimuths of these two lines (4,000 minus 3,400 — 600). Using the same scale as in the preceding steps, he measures on this ray the distance read from station No. 2 to station No. 1 (400 yards) and plots the position of station No. 1.

(f) With the index of the protractor at station No. 1 and the diameter line coincident with the line: station No. 2—station No. 1, he draws a ray on the azimuth read from station No. 1 to base point (2,100). The angle which this ray makes with the line: station No. 2—station No. 1, prolonged through the latter or angle *c*, is the difference of the azimuths of these two lines (3,400 minus 2,100 — 1,300). Using the same scale as in the preceding steps, he measures on this ray the distance read from station No. 1 to base point (800 yards) and plots the position of the base point (*T*).

(g) He connects the points *M* and *T* and measures from *M* the azimuth and range of this line. (Azimuth 2,510, range 1,840 yards.)

c. Aerial photograph method.—(1) The initial direction of fire and range may be determined rapidly by the

use of a vertical aerial photograph having a representative fraction of between 1:10,000 and 1:22,500. Since such a photograph mirrors many terrain features which may be recognized on the ground, for example, trails, woods, single trees, cultivated fields, ravines, etc., it may be used to locate quickly the mortar position, the target, and an aiming point.

(2) The use of an aerial photograph to determine initial direction of fire and range is illustrated as follows: Assume that in Figure 59 (which is an aerial photograph of a section of the Fort Benning, Georgia, military reservation) a platoon of mortars is to fire from a position in the 39th Infantry Woods (*A*) upon a low place in the road (*T*). The platoon commander decides to use the aerial photograph method to determine the initial direction of fire and range to the target. He proceeds as follows:

(a) He selects from the photograph a point in the 39th Infantry Woods—the oval made by the trail at *M*—which he will be able to recognize unmistakably on the ground.

(b) He goes to the point *M*, orients his photograph by means of the arrow thereon, selects the exact position of his base mortar either at or with reference to the oval *M*, and any aiming point, a single tree (*P*) in this case, which he can see from the mortar position and can recognize on the photograph.

(c) He pin pricks on the photograph the position for the base mortar *M*, the target *T*, and the aiming point *P*, connecting the latter two points with *M* by lines drawn with a pin point, hard pencil or other sharp instrument. (During the meantime he may have the platoon occupy the position and lay the mortars parallel with the base mortar, sight set at zero, laid in the direction of the aiming point.)

(d) As soon as the operation described in (c) is completed, the platoon commander determines the initial direction of fire and the range. To determine the initial direction of fire or the horizontal angle through which the mortars must be shifted when laid in the direction of

the aiming point, he places the diameter line of the protractor on the line: *M-P* with the index on *M* and measures the angle between the lines: *M-P* and *M-T*. In this case the shift is *RIGHT 170 mils*. To determine the initial range the platoon commander measures the line *M-T* in inches. This photograph distance is then converted to ground distance by using the formula:

$$\frac{\text{photograph distance}}{\text{ground distance}}$$

. In this case the line: *M-T* measures 4 3/16 inches and the representative fraction (*RF*) of the photograph is 1/15,000. Therefore, the ground distance is 15,000 × 4 3/16 inches = 62,812 inches = 1,745 yards or the initial range to the target.

d. Map method.—(1) When a fire control or similarly accurate map is available, it can be used to determine the initial direction of fire and range. In situations where no fire for adjustment is possible or an aerial photograph is not available, fire may have to be based solely on map data. When a map is used, it should be accurately oriented as to direction and the mortar position carefully located on the map by re-section or some similar method to avoid error.

(2) The use of a map to determine initial direction of fire and range is illustrated as follows: assume that in Figure 60 (which is a section of the Fire Control Map, Fort Benning, Georgia) a platoon of mortars is to fire from a position just north of Davidson Hill at the targets *A*, *B*, and *C*. The platoon commander decides to use the map method to determine the initial direction of fire and the range for each target. Knowing that the mortar position is in the vicinity of Davidson Hill, he first locates the position of his base mortar on the map as a definite point. In order to do this he selects two landmarks; i.e., east water tank and *BM 471*, which appear on the map and which he can see from a point *O* in the vicinity of the mortar position. He reads the magnetic azimuth of these points as 5,415 and 230, respectively. He then determines their back azimuths as 2,215 (5,415 minus

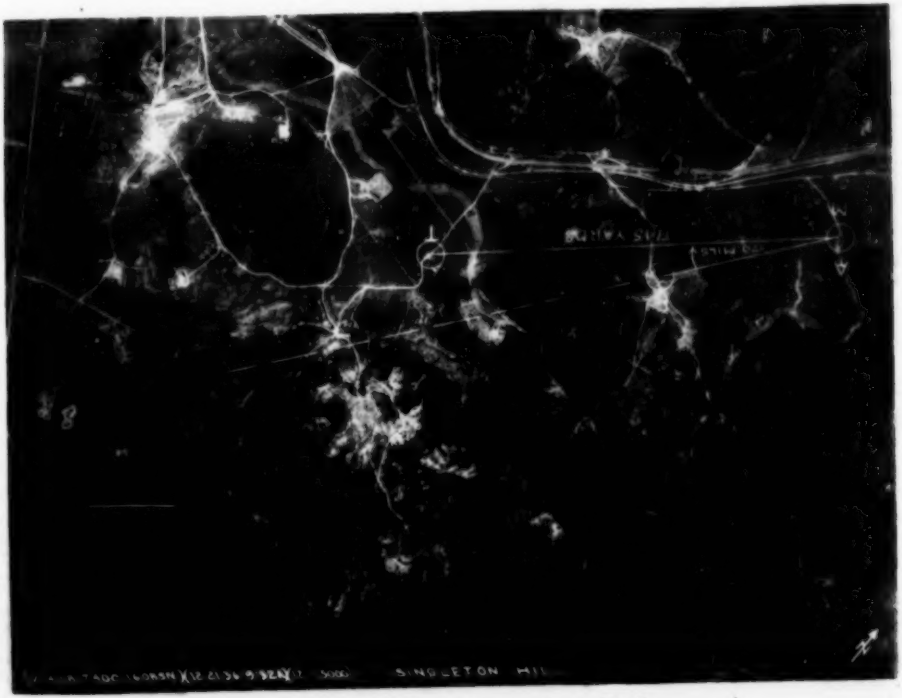


FIGURE 59.—Aerial photograph method.

3,200 — 2,215) and 3,430 (230 plus 3,200 — 3,430), respectively. Subtracting 20 minutes (the difference between grid and magnetic azimuth for this map) from each of the above magnetic azimuths (20/60 degrees × 17.8 mils — 11.9 or 12 mils) he determines the grid azimuths as 2,203 (2,215 minus 12 — 2,203) and 3,418 (3,430 minus 12 — 3,418), respectively. With the index of the protractor on the east water tank and the diameter line parallel to a north and south grid line he draws a ray on the azimuth 2,203. Similarly with the index of his protractor at *BM 471* and the diameter line parallel to the north and south grid line he draws the second ray on the azimuth 3,418. The intersection of these two lines marks the position *O* from which the readings were taken. If this position (point *O*) is not the location of the base mortar he reads the magnetic azimuth from this point to the base mortar, (point *M*) converts it to grid azimuth and draws a ray as described above. The distance: point *O*—base mortar is paced off and the position of the base mortar (point *M*) plotted on the ray. The targets *A*, *B*, and *C* have been either located on the map by the platoon leader or have been furnished him by coordinates or by overlay. If they have been furnished by coordinates or overlay they are transferred to the map and their grid azimuths measured and converted to magnetic azimuths as describeed above. In measuring the grid azimuths the index of the protractor is placed at the point *M* representing the base mortar. Ranges: base mortar—targets are measured using the scale of the map.

e. Correction of data.—(1) Whenever possible, aerial photograph or map data should be corrected by fire for adjustment, either on the target itself or on a point whose position relative to mortar and target is known. This point—called a *check point*—should be one which can be identified both on the aerial photograph or map and the ground. The deflection of the target should be within 300 mils of the check point and the range between 3/4 and 4/3 of the range to the check point. The range

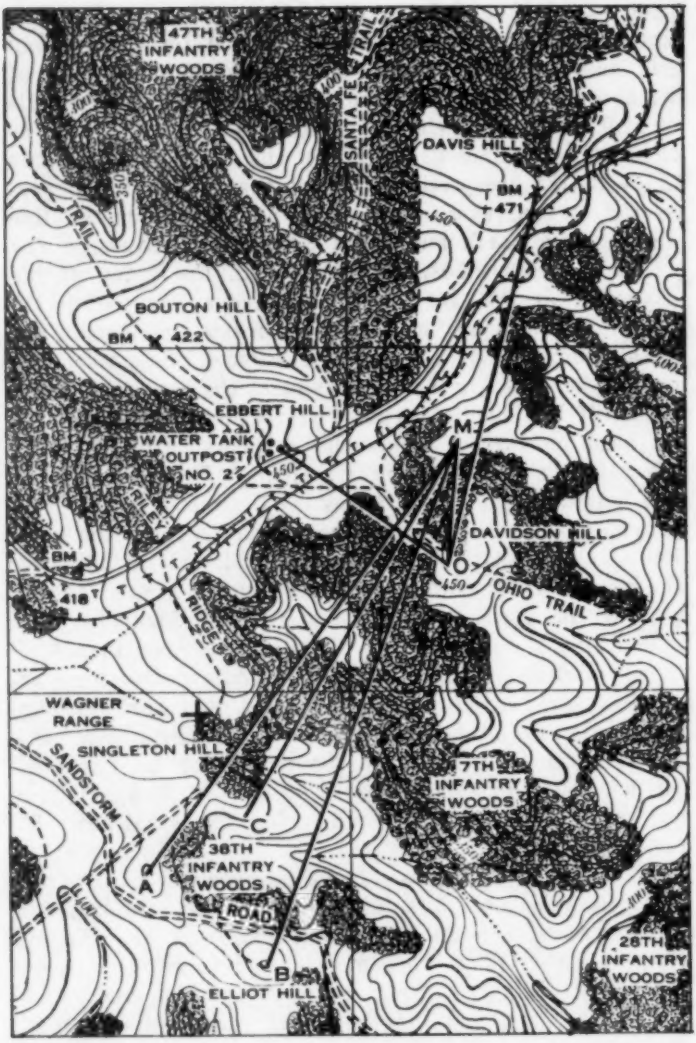


FIGURE 60.—Map method.

correction determined by adjustment on the check point will be the relation:

$$\frac{\text{adjusted range to check point}}{\text{aerial photograph or map range to check point.}}$$

The factor thus obtained is applied to the aerial photograph or map range of the target. The deflection correction determined by adjustment is added or subtracted to the aerial photograph or map deflection of the target from the check point according to the direction of this correction.

f. Liaison method.—An aerial photograph or accurate map greatly facilitates obtaining initial data when fire is conducted by the liaison method.

20. *DETERMINATION OF DISTRIBUTION OF FIRE.*—*a. General.*—As in the case of the squad, the platoon leader must determine the distribution of fire before engaging a target. When firing a single mortar the platoon commander determines distribution as described in paragraph 6. When firing both mortars on the same target he first determines the portion of the target to be covered by each mortar and then determines the distribution.

b. Point targets.—Since point taregts are engaged by fixed fire they are no greater in width and depth than can be effectively covered by the platoon without distributing the fire of either mortar; i.e., a maximum width and depth of 50 yards and 25 yards, respectively. Each mortar is assigned one-half of the target.

c. Area targets.—Area targets for the platoon (any area greater than 50 yards wide or 25 yards deep) require distribution of fire by each mortar. They are divided into halves and a half assigned to each mortar. The distribution of fire of each mortar over its half of the target is determined as described in paragraph 6.

SECTION V

CONDUCT OF FIRE BY THE PLATOON

21. *GENERAL.—a.* The conduct of fire by platoon includes all situations in which the fire of one or both mortars is initiated and controlled directly by the platoon commander. He is assisted by the platoon sergeant who acts as executive at the mortar positions, and by the section leader who performs duties in connection with the preparation and conduct of fire. The squad leaders assist the platoon sergeant by supervising their squads.

b. The usual method of conduct of fire by platoon, described herein, is the *axial method* (paragraph 2 *d*). When the axial method does not apply the *liaison method* which is described in Section VI, is used.

c. The conduct of fire by the platoon includes the same elements as described for the squad; i.e., fire commands, sensing, fire for adjustment, and fire for effect. These elements, as described in this section, contain only the points wherein they do not apply to or are different from the squad. Since sensing is the same in both the squad and platoon it is omitted.

22. *FIRE COMMANDS.—a. General.*—(1) The principles governing the fire commands of the squad apply in general to the platoon. The differences are due chiefly to the necessity of conducting the fire of two mortars instead of one.

b. Origin and transmission.—Fire commands originate with the platoon commander who transmits them to the platoon sergeant at the mortar positions by voice, arm-and-hand signals, messengers, or, if available, by telephone. The platoon sergeant repeats the commands to the mortar squads by voice, converting the elements, when necessary, into proper commands. The gunners repeat the commands of the platoon sergeant.

c. Changes.—As in the case of the squad, after the initial fire command, the range (or elevation) is an-

nounced and, unless otherwise prescribed, only such other elements as it is desired to change. When firing both mortars, a change for an individual mortar is preceded by the command: *NUMBER 1 (*or *NUMBER 2) (SO AND SO).* An individual change is announced and set after any general change of the same element.

d. Opening, ceasing, and suspending fire.—Fire is begun at the platoon sergeant's command *FIRE, NUMBER 1 (*or *NUMBER 2) FIRE,* or *RESUME FIRING.* The only exceptions are when the squad leader is conducting the fire of his squad during schedule fire or the platoon commander desires to give the commands directly to the mortar squads. For the platoon sergeant, the indication to fire the platoon is the last element of the platoon commander's command, except when otherwise specified. The platoon sergeant usually gives the commands *CEASE FIRING* or *SUSPEND FIRING* in accordance with the principles described for the squad.

e. Following commands.—(1) A fire command is followed by both mortars, unless it includes the element: *NUMBER (SO AND SO) ADJUST.* This may be given as the first element of a fire command for the purpose of requiring the mortar not specified to remain on its particular mission, and the one specified to follow subsequent elements. *NUMBER (SO AND SO) ADJUST* may also be given immediately preceding the method of fire to require the mortar not specified in the command to cease following and remain as then laid, while the one specified continues following. To require the mortar that has not been following to follow, *PLATOON ADJUST* is given as the first element of a subsequent fire command.

f. Change interval between bursts.—To change the interval between the bursts of the two mortars the command is: *ON NUMBER 1 (*or *NUMBER 2) OPEN (CLOSE) (SO MUCH);* or *NUMBER 1 (*or *NUMBER 2) RIGHT (LEFT) (SO MUCH).*

g. Mortars to fire.—To fire the platoon, the command is *PLATOON.* To fire an individual mortar the command is *NUMBER 1 (*or *NUMBER 2).*

h. Methods of fire.—(1) The methods of fire are:
(a) Salvo fire.
(b) Volley fire.
(c) Volley fire sweeping.

The command for salvo fire is *PLATOON RIGHT (LEFT)* which indicates that the mortars are to fire successively from right to left, or vice versa, at the command of the gunners and at an interval of five seconds. If a different interval is desired the words *AT (SO MANY) SECONDS* are added to the command above. The methods of volley fire and volley fire sweeping are described for the squad (paragraph 8 *c* (4) (b) and (5) (b)).

23. *FIRE FOR ADJUSTMENT.*—*a.* Fire for adjustment with a single mortar is conducted by the platoon commander in the same manner as that prescribed for the squad leader. Fire for adjustment with both mortars is begun with a single mortar, the base mortar. The other mortar is laid parallel to the base mortar and executes all commands without firing until it is desired to include it in the adjustment. It is brought in as soon as a 200-yard range bracket has been established with the base mortar. The subsequent procedure depends on whether the adjustment is on a point or area target.

b. Point target.—The procedure in adjusting the platoon for range on a point target is the same as for the squad (paragraph 10 *f*). Since two mortars are fired the probability of securing an early positive sensing for range is increased. The procedure in adjusting for deflection is influenced by the necessity of completing the adjustment with each mortar laid properly on the target. That is, if the target is 25 yards or less in width, each mortar must be laid on the center of the target. If the target is greater than 25 yards (maximum 50 yards) in width, each mortar must be laid on its half of the target or with an interval equal to twice the radius of a burst (25 yards). Since the two mortars are parallel when the second mortar fires its initial round, the bursts of the two mortars are at an interval equal to the interval of the

mortar positions. During the subsequent firing the interval between the bursts is opened or closed so as to place the fire of each mortar properly on the target. In the case of a target 25 yards or less in width, the fire is closed on the center of the target. Since the mortars are laid parallel, this requires that the fire of the mortars be converged. For example, if the mortars are at an interval of 50 yards and are to be closed on the center of the target at a range of 1,600 yards, the command might be *ON NUMBER 1 (*or *NUMBER 2) CLOSE 33, 1,600.* The No. 2 mortar takes a deflection in the direction of No. 1 mortar in mils equal to the amount of the interval of the mortars in yards divided by 1/1,000 of the range (range in thousands of yards). In the case of a target greater than 25 yards and less than 50 yards in width, either mortar is closed or opened on the other so that the interval between bursts is 25 yards and their fire is placed so that each mortar covers its half of the target. For example, if the mortars are laid parallel with an interval of 50 yards and the target is about 35 yards wide and at a range of 1,500, the deflection amount to close the interval to 25 yards is computed as follows: 50 yards minus 25 yards — 25 yards, or in mils 25/1.5 — 16.7 or 17 mils.

c. Area target.—The procedure in adjusting the platoon on an area target is the same as for a point target except, as described for the squad, the final bracket sought is 50 yards. With the base mortar laid on an edge of the target and the second mortar laid parallel, it is necessary to adjust the interval between the bursts to an amount equal to one-half the mil width of the target before fire for effect is begun. This will place the second mortar at the center of the target in the same relative position to its assigned half as the first mortar (corresponding edge). For example, if the base mortar is laid on one edge of a target 100 yards wide, the interval between mortars is 25 yards, and the range to the target is 1,600 yards, the amount of deflection to place the second mortar on the corresponding edge of its half of the

target; i.e., the amount to open or close, is computed as follows: one-half the target or 50 yards less 25 yards, the mortar interval, equals 25 yards or in mils 25/1.6 — 15.6 or 16 mils. The deflection change applied to place the second mortar on the correct part of the target is 16 mils in the direction away from the base mortar.

24. *FIRE FOR EFFECT.*—The mortars having been properly laid to begin fire for effect as described in paragraph 20, the procedure for each mortar is the same as described for the squad. Each mortar fires on the target or its portion of the target as if it were firing on an individual target.

25. *TYPE PROBLEMS.*—The following type problems illustrate the procedure in the axial conduct of fire of the platoon.

a. Type problem for fire on a point target.—

TYPE PROBLEM, AXIAL FIRE OF THE PLATOON

Initial Command: *H. E. LIGHT, BASE DEFLECTION, RIGHT 110, BASE STAKE, NUMBER 1, ONE ROUND, 1,200.*

COMMANDS	SENSINGS		REMARKS
(See initial command) PLAT. ADJ., L 50, No. 1, 1 RD., 1,400	50 R 10 L	SHORT OVER	Next round will split 200 yd. bracket. No. 2 is brought in.
PLAT. ADJ., L 10 ON No. 1 CLOSE 18, PLAT. RIGHT, 1,300 No. 2, R5, 1,350	No. 1, Line No. 2, 5 L No. 1, Line No. 2, Line	SHORT SHORT OVER OVER	
1,325 PLATOON FIVE ROUNDS, 1,325	No. 1, Line No. 2, Line	SHORT SHORT	1,325 is selected as range to begin fire for effect.

b. Type problem for fire on an area target.—The target is approximately 100 x 100 yards, and the method of distribution discussed in paragraph 6 *b* is used.

TYPE PROBLEM, PLATOON FIRE ON AREA TARGET

Initial command: *H. E. LIGHT, BASE DEFLECTION LEFT 75, BASE STAKE, NUMBER 1, ONE ROUND, 1,400.*

COMMANDS	SENSINGS		REMARKS
(See initial command)	20 L	OVER	
PLAT. ADJ., R 20, No. 1, 1 RD, 1,200	10 R	SHORT	Sensing made on burst closer to line M-T.
PLAT. ADJ., L 10, PLAT. RIGHT 1,300	No. 1, 5 L No. 2, 25 L	OVER OVER	
R 5, 1,250	No. 1, Line No. 2, 20 L	SHORT SHORT	
L 25, ON No. 1 OPEN 24 PLAT. 3 RDS SWEEPING, LEFT 1½ TURNS, ZONE 1,250—1,350			The adjustment in this case is on a point 25 mils left of the right limit of the area. 1,250 is range to near limit of area.

SECTION VI

CONDUCT OF FIRE BY LIAISON METHOD

26. *GENERAL.*—*a.* The conduct of fire by the liaison method is applicable to a situation in which, due to the location of the platoon observation post, the platoon commander is unable to conduct fire by the axial method. It is the method used when liaison personnel or a forward observer is employed.

b. Because of the distance from the observer to the platoon position, communication by voice or arm-and-

hand signals will rarely be practicable and other means such as radio will be necessary. The communication is between the observer and the platoon commander who issues fire commands to the platoon.

27. *PRELIMINARY ARRANGEMENTS.*—Before going to his observation post the observer should secure the following information:

a. Any particular targets upon which his commander desires that he observe the fire.

b. A list and description of the platoon base point and such targets as have been designated.

c. A map or air photograph, if available, on which the observer has plotted the platoon position and the points mentioned in *b.*

d. The general location of the platoon position.

28. *DESIGNATION OF TARGETS.*—*a.* The observer may designate targets by any of the following methods:

(1) By target number when the target upon which fire is desired coincides with a target previously designated by number, for example: *TARGET NUMBER 3, WORKING PARTY, CAN OBSERVE.*

(2) By sensing some *reference point* with respect to the target. This reference point is preferably a base point but may be a numbered target or a known terrain feature, as for example: *BASE POINT 300 LEFT, 400 SHORT, MACHINE GUNS, CAN OBSERVE.* When a satisfactory reference point is not available, the observer may call for a round of smoke in the center of the target area and sense this round with respect to the target.

(3) By coordinates, from a map or gridded air photograph, as for example: *COORDINATES 55-69, OBSERVATION POST, CAN OBSERVE.*

b. In the designation of targets, the observer must give a description sufficiently complete to enable the platoon commander to determine the allotment of ammunition and the number of mortars to be used. If the target is of such size and importance as to require the fire of more than

one platoon, the observer, if observing for more than one platoon, includes in his report: *REQUEST (SO MANY) PLATOONS.*

29. *PROCEDURE.—a.* When an observer desires to call for mortar fire, he sends a message to his commander describing and locating the target in the manner indicated in paragraph 28, above, and adds the words *CAN OBSERVE*, if such is the case and fire is desired.

b. When the commander receives this message, he decides whether the target is to be taken under fire, and if so, by how many mortars.

c. The observer reports the error of each burst in direction and range. The errors are reported in yards with respect to the line: mortar—target. Until the observer is well oriented by previous firing or by a study of available maps or air photographs, it is advantageous to sense a single element (either range or deflection) for each round, until the bursts are near the target.

(1) *Deflection.*—The observer senses an error in deflection and reports the amount to the nearest 10 yards, as for example: *70 LEFT.* If the error is less than 10 yards, the sensing is given as: *LEFT (RIGHT).* The platoon commander makes a change in the opposite sense by an amount equal to the error divided by the range in thousands of yards (range-deflection table, paragraph 43).

(2) *Range.*—The range error is sensed to the nearest 100 yards, as for example: *300 OVER.* If less than 100 yards, the error is reported as: *OVER (SHORT).* If the observer does not desire the range changed, he senses: *RANGE CORRECT.* If all elements of data are correct, the observer reports: *TARGET.* If the desired bracket has not been established and the observer reports *OVER (SHORT)*, the platoon commander changes his range 100 yards in the proper direction for the next round. As soon as a 100-yard bracket is established, the procedure is the same as in the bracketing method. Adjustment is continued until the observer considers it satisfactory and

sends: *FIRE FOR EFFECT,* or until the platoon commander is satisfied with the adjustment.

d. The observer watches fire for effect. If he observes that the desired effect has been obtained, he reports: *MISSION ACCOMPLISHED.* Firing then ceases. If the fire for effect as a whole is not effective, he senses and reports errors. If, upon the completion of fire for effect, the mission has not been accomplished, he may ask that the fire for effect be repeated by the message: *FIRE FOR EFFECT.*

30. *TYPE PROBLEM.*—The following type problem illustrates the procedure of an observer who is a liaison officer in the liaison method of conduct of fire.

a. A liaison officer of the 4th Battalion, 29th Infantry, has been sent forward to an assault battalion of the 29th Infantry. He has not been directed by his battalion commander to observe fire on any special targets. He knows the base point of the 1st Platoon, Mortar Company. He has a mosaic with an overlay showing the base point and numbered targets of this platoon. He is in communication with the platoon commander.

b. After the attack starts, the assault rifle battalion commander asks the liaison officer for mortar fire on a hostile machine gun causing casualties in his battalion. The liaison observer goes to a position from which he can see the target. The observer reports to the mortar platoon commander the location and nature of the target and that he can observe the fire. The platoon commander determines the number of mortars to fire and the initial fire data. *Great accuracy in initial laying is unimportant; speed is essential.* The observer reports the error in deflection and range and the platoon commander makes the appropriate corrections until fire is adjusted and the result accomplished by fire for effect. The following tabulation is a summary of the foregoing problem:

Narrative	*Communication*	*Commands*	*Remarks*
Observer reports target	BASE POINT, 100 RIGHT 300 SHORT, MACHINE GUN CAN OBSERVE		Reference point is any point known by both the observer and platoon commander (may be base point or other point)
Plat. Comdr. sends:	MESSAGE RECEIVED		Mission assigned to base mortar
Data is computed and both mortars laid		H.E. LIGHT, BASE DEF., LEFT 67, BASE STAKE, AT MY COMMAND, NO. 1, 1 ROUND, 1,500	Base deflection is indicated by aiming stake
Plat. Comdr. reports:	READY TO FIRE		
Observer sends	FIRE	FIRE	
Plat. Comdr.. reports:	HAVE FIRED		Sent when the command to fire is given base mortar.
Observer senses:	50 RIGHT, 200 SHORT	PLATOON ADJUST, LEFT 34 NO. 1, 1 ROUND, 1700, FIRE	
Plat. Comdr. reports:	HAVE FIRED		
Observer senses:	20 LEFT 100 OVER	PLATOON ADJUST, RIGHT 12, PLATOON RIGHT, 1600	
Plat. Comdr. reports:	HAVE FIRED		
Observer senses:	LEFT, SHORT	1,650	Deflection within 10 yards. Range within less than 100 yards

Narrative	*Communication*	*Commands*	*Remarks*
Plat. Comdr. reports:	HAVE FIRED		
Observer senses:	RIGHT, OVER	1,625	
Plat. Comdr. reports:	HAVE FIRED		
Observer senses:	TARGET	PLATOON, 5 ROUNDS	
Plat. Comdr. reports:	FIRE FOR EFFECT		Observer reports on effect.

SECTION VII

PREPARED FIRES

31. *GENERAL.*—Prepared fires are planned fires for which data are prepared in advance. Prepared fire is usually area fire, since the targets selected are areas which the enemy is most likely to occupy. Fire on an area is a *concentration.* Under favorable conditions, a limited number of prepared fires may be assigned orally, the targets being pointed out on the ground. Assignment may be by overlay or by aerial photograph or map, in case an aerial photograph or map is available. The most suitable method is a combination of overlay and aerial photograph, or map—where these are available—and the targets are pointed out on the ground.

32. *SCHEDULE FIRES.*—Schedule fires are prepared fires executed according to a time schedule or upon signal or call from the supported troops. Such fires are assigned by the mortar company commander or the commander of the supported unit, either orally or by aerial photograph, map, overlay or by a combination of these. The time of firing or designation of the signal to fire a particular concentration or group of concentrations and the amount of

ammunition for each are furnished the platoon commander.

33. *METHOD OF PREPARING DATA.—a.* Firing data to execute prepared fires are computed as described in Section IV. These data are recorded in any convenient manner which will facilitate their use. They may be tabulated on a form similar to the one shown in the lower half of Figure 63. This form contains all the data necessary to fire each concentration. Columns 2 to 7, inclusive, express the fire commands in their proper sequence. In the case of schedule fires the time may be placed in column 1 under the task number.

b. Concentrations are usually designated on an aerial photograph, map or overlay as circles whose diameters are 50 yards or 100 yards; i.e., as the area to be covered by a single mortar (Figure 61). Where it is desired to assign a larger area, it is divided into multiples of 100 yards in width and depth (indicated by the required number of tangent 100-yard circles).

34. *NORMAL CONCENTRATIONS.*—In a defensive situation each mortar usually is assigned a normal concentration to cover a sensitive area or a likely avenue of approach close to the front line (but not closer than 100 yards). The normal concentration is the first priority mission of the mortar to which it is assigned. It is fired on a prearranged signal. When data has been prepared for this concentration, a separate aiming stake is placed to mark its deflection. When not engaged in firing, the mortar is kept laid on its normal concentration. If the signal is received while firing at another target, fire is placed immediately on the normal concentration.

35. *EMERGENCY CONCENTRATIONS.*—Each mortar is usually assigned an emergency concentration in addition to its normal concentration. An emergency concentration is supplementary and similar to the normal concentration, but is placed in some other part of the de-

fensive sector. An emergency concentration is useful in a local hostile attack when the mortar assigned it is not called upon to fire its own normal concentration.

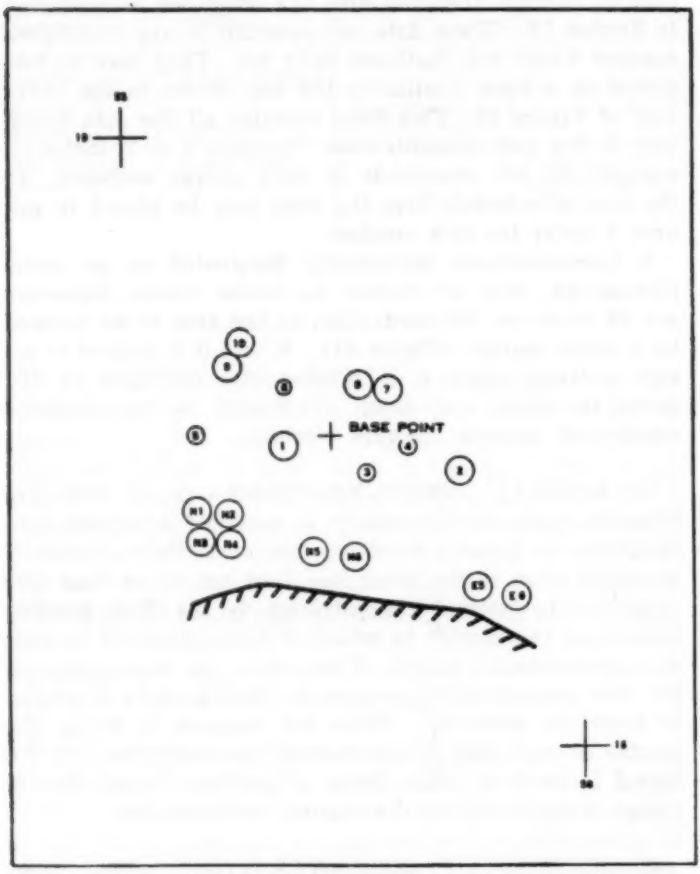


FIGURE 61.—An overlay.

36. *OVERLAYS.*—An overlay (Figure 61) showing the prepared fires is convenient in assigning concentrations

when an aerial photograph or map is available. Standard circles for 50 x 50-yard and 100 x 100-yard areas are used to show the size of the concentrations for each target. Normal concentrations are designated by the letter *N* and the squad number of the assigned mortar, as for example, *N1*, which designates the normal concentration for 1st mortar squad. Emergency concentrations are designated by the letter *E* and the squad number. All other concentrations are designated by number. Base points (if any) are designated by crosses. The usual means of orienting the overlay by coordinates and the location of the front line are shown on the overlay.

SECTION VIII

SMOKE

37. *GENERAL.*—Smoke shell is used primarily for blinding enemy observation, either to reduce effectiveness of hostile action or to conceal movements of friendly troops. Individual rounds may be used to designate targets or to identify the fire of a particular mortar. Smoke is most advantageously used for screening when the direction of the wind is parallel to the front to be screened. A screen may be built up in a head or rear wind by adjusting each mortar on its appropriate part of the front, and, from observation of the screen, maintaining the required rate of fire. In the case of a head wind, consideration should be given to the effect of drifting smoke on our own troops, and the supported troops should be consulted before the smoke screen is formed. Smoke shell ordinarily should not be used in a head wind on objectives which are closer than 1,000 yards from our attacking troops.

38. *ACTION OF A BURST.*—When a smoke shell bursts, most of the chemical content is converted to smoke which drifts with the wind. Smoke from shell filled with

white phosphorus (*WP*) tends to rise. White phosphorus also has an incendiary effect sufficient to produce casualties against unprotected personnel.

39. *BUILDING UP A SCREEN.*—Moist ground and cool weather with little or no wind (not more than 12 mph) afford the most favorable condition for smoke. Observation is essential. A screen is formed by firing volleys of smoke shell rapidly and distributed to fit the target, each mortar being directed to the windward of its portion of the front to be screened. The screen becomes fully effective at about 100 to 200 yards from the point of burst; its effectiveness continues until the screen is too thin to prevent observation. The general tendency is to form too dense a screen.

40. *METHOD OF FIRE.—Fire for adjustment and effect.*—Fire for adjustment is usually made with one mortar and the platoon fired for effect. The fire must be observed at all times and the data changed as necessary to maintain the screen. In fire for effect, several volleys are fired at a rapid rate to build up the screen. After the screen is built up, the platoon may then be converged to the windward and only the rate of fire necessary to maintain the screen employed. Individual changes in deflection or range may be made as necessary to thicken any portion of the screen requiring it.

SECTION IX

RECORDS

41. *RANGE CARDS.—a. General.*—In order to be prepared to deliver fire promptly on likely targets in any situation, data which will facilitate the laying of the mortar during hours of both good and limited visibility must be determined by each mortar squad immediately after occupying a position. These data must be determined to all key points at or near which targets may be

expected, such as crossroads, ridges, reverse slopes, woods, and important defiladed areas. The targets include areas which may be occupied by the enemy. The data also must be recorded in a form which will serve as a guide to the leaders and mortar crew. A range card for each mortar is used for this purpose. It is in the form of a sketch of the sector, showing only the probable location of targets and the data as to direction and range necessary to place fire on them. Duplicates of the original range cards prepared during the occupation and consolidation of a newly occupied position are collected by platoon leaders, who consolidate them for their units. With the addition of such brief explanatory remarks as may be necessary, these reports are sent back to the company commander. Such reports are of great value in planning the coordination of defensive fires.

b. Preparation of range cards.—(1) Range cards should be prepared by the mortar squad leaders immediately upon occupation of defensive positions and copies sent to the next higher commander. The range cards form a part of the record turned over to the relieving mortar crews, and are considered a part of the special orders for a position. Range cards also should be prepared as soon as possible for alternate and supplementary positions. It will greatly facilitate the preparation of range cards in the field if some basic form such as that shown in Figure 62 is made up beforehand and issued to squad leaders.

(2) In preparing range cards, the following should be taken as guides:

(a) A code designation should be given the squad, platoon, and company, followed by the accurate location of the mortar position and the date of occupation.

(b) A means of orienting the card, either by compass direction or by reference to prominent features, should be provided.

(c) All data and instructions should be legibly printed.

(d) Base point and normal concentration should be clearly indicated.

(e) All landmarks or targets should be indicated by conventional signs or sketches in perspective. They should be named where necessary to prevent misunderstanding.

(f) Targets should be numbered from left to right.

(g) The deflection from the base point and the range of all targets should be clearly indicated on the card.

(3) Figure 63 is an example of a range card for use in defense.

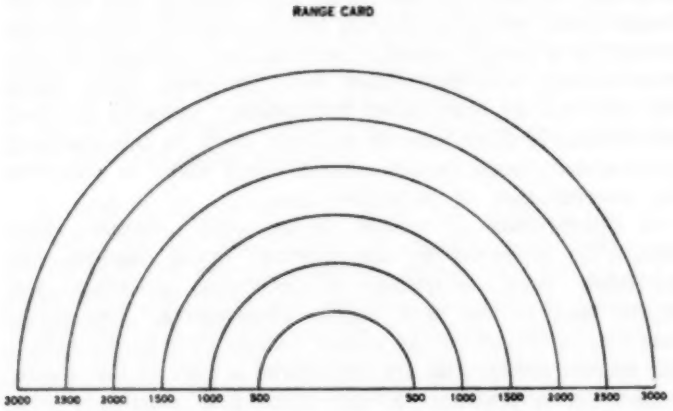


FIGURE 62.—Form for range card.

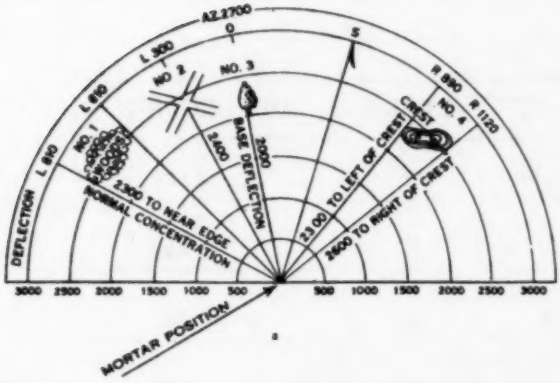
(4) The form for recording data for prepared concentrations, including normal concentration, is shown in Figure 63 below the range card. It is convenient to have this data on the range card as one record supplements the other and both facilitate the recording of prepared data.

42. *RECORD OF DATA.*—The squad leader should tabulate all adjusted data for each target and base point on a form similar to the one shown. This recorded data may be used to reopen fire on a target or to engage another target in its locality. For example, the first target engaged will normally be used as a base point; at

least, until a more suitable one is obtained. Upon the completion of fire on this target the gun commander records data as follows: In the column headed *TASK* the

RANGE CARD

FIRST SQUAD
FIRST PLATOON
COMPANY NO. M-1
LOCATION: 7TH INF. WOODS
DATE: FEB. 7, 19___



a

TASK NO.	TYPE OF SHELL	DEF	STAKE	NO. RDS SWEEPING	DIRECTION & NO. TURNS TRAVERSE	ZONE RANGES	NO. OF ELEVATIONS	TOTAL RDS

b

FIGURE 63.—Defense range card and form for data.

letters *B.P.* for base point; in the column headed *STAKE* the letter *B* for base stake; in the column headed *DEFLECTION*, in the case of the base point only, he records

the azimuth of base deflection; and in the column headed *RANGE* he enters the range. Each subsequent target is a numbered task as shown. In the column headed *STAKE*, the letter designation of the aiming stake used is recorded. In the columns headed *DEFLECTION* and *RANGE*, respectively, only the adjusted deflection and range are entered. If a new base point is used, its data is entered. Upon the command, *MARK NEW BASE DEFLECTION*, the letters *B.P.* and *B* of the data for the original base point are lined out as shown in the tabulation below.

GUN *1.*—

TASK	STAKE	DEFLECTION	RANGE
~~B. P.~~	~~B.~~	Az. 3,100	1,500
1	B.	L 200	1,700
2	A.	R 300	1,800
B. P.	B.	Az. 3,300	1,600

43. *DEFLECTION—CONVERSION TABLE.*—It is frequently necessary in the preparation and conduct of fire to convert yards of deflection to mils at various ranges. The table shown below may be used for this purpose as follows:

Example: The reader wishes to know the equivalent in mils for a deflection error of 100 yards at a range of 1500. Reading horizontally on the line marked 1500, he finds that in the column headed 100, the number of mils is 67.

81-mm MORTAR
DEFLECTION-CONVERSION TABLE
Yards to Mils

Range	1 yd	10	20	30	40	50	75	100	125	150	175	200	300	400	500
500 yds	2 mils	20	40	60	80	100	150	200	250	300	350	400	600	800	1000
600	1.7	17	34	51	68	85	128	170	212	256	298	340	510	680	850
700	1.4	14	28	42	56	70	105	140	175	210	245	280	420	560	700
800	1.3	13	26	39	52	65	98	130	163	195	228	260	390	520	650
900	1.1	11	22	33	44	55	83	110	138	165	193	220	330	440	550
1,000	1.0	10	20	30	40	50	75	100	125	150	175	200	300	400	500
1,100	.91	9	18	27	36	45	68	91	114	136	159	182	273	364	455
1,200	.83	8	17	25	33	42	62	83	104	125	145	166	249	332	415
1,300	.77	8	15	23	31	39	58	77	96	116	135	154	231	308	385
1,400	.72	7	14	21	28	36	54	72	90	108	126	144	216	288	360
1,500	.67	7	13	20	27	34	50	67	84	101	117	134	201	268	335
1,600	.63	6	13	19	25	32	47	63	79	94	110	126	189	252	315
1,700	.59	6	12	18	24	30	44	59	74	89	103	118	177	236	295
1,800	.56	6	11	17	22	28	42	56	70	84	98	112	168	224	280
1,900	.53	5	11	16	21	27	40	53	66	80	93	106	159	212	265
2,000	.50	5	10	15	20	25	38	50	63	75	88	100	150	200	250
2,100	.48	5	10	14	19	24	36	48	60	72	84	96	144	192	240
2,200	.46	5	9	14	18	23	34	45	58	69	81	92	138	184	230
2,300	.44	4	9	13	18	22	33	44	55	66	77	88	132	176	220
2,400	.42	4	8	13	17	21	32	42	53	63	74	84	126	168	210
2,500	.40	4	8	12	16	20	30	40	50	60	70	80	120	160	200
2,600	.38	4	8	11	15	19	29	38	48	57	67	76	114	152	190
2,700	.37	4	7	11	15	19	28	37	46	56	65	74	111	148	185
2,800	.36	4	7	11	14	18	27	36	45	54	63	72	108	144	180
2,900	.35	4	7	11	14	18	26	35	44	53	61	70	105	140	175
3,000	.33	3	7	10	13	17	25	33	41	50	58	66	99	132	165

CHAPTER 12

Napoleonic Discipline

The armies of Napoleon were magnificient fighting machines. The maneuvers of these armies are the subject of countless books. Not so much attention, however, has been paid to the type of discipline that in those days welded heterogeneous groups of men into compact fighting organizations.

However, one Napoleonic officer has left us a picture of the discipline of French Armies. Lieutenant Colonel F. de Brack, in 1830, faced with the job of organizing a regiment for war, hastily put together his thoughts and experiences in one small volume—now almost forgotten—that could be readily distributed to his men. He had been an officer in the Napoleonic campaigns and had been only recently restored to duty; therefore we have, not a speculative treatise based on peacetime experience, but a practical manual derived from years of warfare. From de Brack's military catechism—that is what it is—we will abstract his chapter on discipline, for that discipline was of such a sort that it enabled Napoleon to win great battles and shake Europe to its foundations. It will certainly pay us to know more of it.

DISCIPLINE

Q. *What is discipline?*

A. The soul of armies; without discipline there can be no army.

Q. *What is the mainspring of discipline, in war?*

A. Honor.

Q. *How is it to be stimulated?*

A. By praise and blame.

Q. *If they do not suffice?*

A. Then punishments, more severe than those inflicted in peace, must be imposed.

Q. *Why this difference?*

A. Because offences committed in war differ from those which may be committed in garrison. Because they have different consequences. Because men who commit themselves, if not reclaimed by a sentiment of honor, receive less consideration than anywhere else. Because the punishments that can be inflicted are not so numerous nor so finely graduated. Because the more serious consequences offences may have, the more necessary it is that striking examples should be made of the offenders.

In peace, you do not have to punish such offences as abandoning a post, cruelty, cowardice, etc., and you have, for such offences as are committed, the graded punishments of confinement to barracks, the guardhouse, prison, dungeon, disciplinary companies, etc. At the outposts, nothing of that sort can exist, so that it is necessary, while overlooking mild offences which, in garrison, would receive punishment, to strike hard when punishment must be inflicted.

Q. *How would you grade the punishments to be inflicted?*

A. The reprimand in private; then in front of the troops; fatigue duty; confinement under charge of the camp guard; to be dismounted for one or several days, and marched with the advance guard; dismount the trooper and send him back to the army; have him driven out by his peers and handed over to the justice of the provost marshal; these last two should be inflicted only in case of incorrigibility, mutiny, or cowardice.

Q. *Will blame answer the purpose?*

A. Yes; often, because it is administered publicly, and to men sensible of the gravity of the situation.

Q. *And the rewards?*

A. As a disciplinary force, rewards are much more powerful than punishments. The more prolonged a war

is the more this force increases; because, hard service having relieved you first of the bad soldiers who take advantage of any pretext to leave, then of the mediocrities of no force, there will remain only the flower of your ranks, whom honor will control better than fear.

Q. *What scale of rewards would you establish?*

A. A complimentary word spoken in front of the regiment; marks of esteem, repeated as often as occasion offers; the choice of a confidential mission offering a chance for gaining distinction; approbation expressed in regimental orders; should a worthy soldier be dismounted, give to him instead of to any other a spare horse; the day of a review call this man out of the ranks and present him to the general; promotion; nomination for admission into the Legion of Honor.

The severity of the laws of military discipline should be adapted, as a whole, to the spirit of the people to be governed by them, and, in detail, to the character of the provinces furnishing the recruits; to the different characters of those whom you command, and to the degree of comfort or privation existing in the army.

The application of these laws is a matter which demands, more than any other, perhaps, the keenest powers of observation on the part of a commander. To treat a Frenchman like a Dutchman, to punish one man exactly like another, displays only ignorance or laziness on the part of authority, and cannot possibly effect any useful purpose.

In many cases, the application of military law should be made rather according to the enlightened conscience of the juror than to the strict severity of the judge.

Discipline is not in itself the end we seek, but a means of securing it; it is not to be obtained by punishment only, for rewards pertain to it also; the law should be applied according to the spirit rather than the letter. To accomplish that, the commander must combine with the constant exercise of observation the greatest firmness in the execution of the law.

The basis of all discipline is the study of, and acquaintance with, the men subject to our orders. Every good offi-

cer or noncommissioned officer should be able to call by heart the roll of his squadron, and give a detailed history of the military lives of his men.

Q. *How do you apply your punishments?*

A. In war every offence should be noted as soon as committed, and the punishment should follow at once. In that way the soldiers will be impressed by the example made, and those remarks and discussions, common companions of insubordination, which soon degenerate into revolt if not forcibly stopped in the beginning, will be avoided.

Shirking is the one vice to be punished before all others; as soon as it shows itself smash it as you would a glass.

However small the number of men you command, there will be leaders among them. Some of them go straight along the right road, the others turn their backs upon it. Study them both constantly, determine their influence, and as soon as an occasion presents itself reward the first—for they are precious models—and treat the others severely and without indulgence, for they are the very pests of disorganization. Thus you will deprive them of the moral influence they might otherwise exert, and, if they stir again, you will have to deal with them only, instead of with a conspiracy.

I repeat it, a method which never fails, and which is the better the higher the grade of the officer who employs it, is to have the names of all his men by heart so that he can call each by name, and prove to him publicly and with a few words that he knows him and will not lose sight of him.

Whatever your rank, never remit a punishment which one of your subordinates may order for one of his men; that would end all discipline. If you find the punishment unjust or too severe, send for the officer who ordered it and privately direct him to remit it.

In France, the soldier desires liberty less than that justice which is the right of all, and which allows the balance to be borne down by true merit only. Let him suffer like his comrades and he does not complain; let him be a little less fortunate than they in prosperity, and he cries out against the injustice; this knowledge of his disposition should teach his commanders how to deal with him.

If discipline does not admit of the principles of equality, the prerogatives of command should never exceed their just limits. In campaign let there be as perfect equality in suffering and privation as in the chances of being killed.

No officer should wear his cloak if the soldier has not been directed to put on his; to warm himself in a house which the soldier has been forbidden to enter.

To monopolize for himself or his horses a barn which would shelter his men.

To demand for himself an excessive portion of the issues made in bivouac, while the soldier receives what is barely necessary.

He should, under all circumstances, defend his men, whether attacked by the enemy, or insulted or maltreated without reason by another officer of the army, or when issues ordered by the General are not made as directed.

He must protect the sick and wounded, under all circumstances, and, finally, show himself worthy of his epaulettes.

Share with the soldier and he will share with you, and you will never be cheated in that market; you shall see, some day, when everything fails you, how this old soldier will be proud, happy even, to offer you his bread and his life.

Beware however of thinking that in order to gain the affection of your soldiers, it is necessary to be lax with them, for you will be completely deceived. I have known officers beloved by their soldiers, and have studied them for my own instruction; they were just, very firm, independent of the inferior cliques which always endeavor to monopolize a commander; on the battlefield they displayed the greatest bravery, and, in bivouac, they were vigilant, unsparing of themselves as of others, generous with what they had, and they spoke a language which the soldier understood; there is the secret of their absolute power, of the fanatical devotion which they inspired. Under them discipline was instinctive; no one ever thought of infringing its rules, but, if by chance any one exhibited a disregard of his duties, the justice of his comrades spared their commander the trouble of punishing him. Under the command of a man

of that temper everything is easy; the regiment becomes a family—a family capable of performing prodigies.

Q. *What gives the greatest power to the laws of discipline?*

A. The respect which a commander inspires.

Q. *What gives the greatest facility in their application?*

A. Subordination.

Q. *What assures subordination?*

A. An intimate knowledge of the authority of each military grade.

Q. *What assures to orders their useful effect?*

A. First, the briefness and firmness of the tone in which they are given; second, inflexibility in their execution. Orders given and supported in that way, are always promptly obeyed.

Q. *What, then, produces well-ordered discipline?*

A. Unity and promptness of action.

Q. *What produces unity of action?*

A. *Esprit de corps*, which, in war, might be more properly called the very life of the regiment.

Q. *In war should one obey the orders of all officers superior to him in rank?*

A. One should be respectful to every officer, no matter of what arm, who is his superior in rank; but one should obey only the orders given by his immediate commanders, when they belong to his corps, or when, if not belonging to it, they have been recognized by his fellow-officers.

Q. *What punishments may be inflicted upon an officer?*

A. A private warning; a public reprimand; simple arrest, which consists in marching in rear of his squadron and being temporarily deprived of command.

Close arrest, which consists in being deprived of sword and command, being placed in charge of the camp guard, and being compelled to march in front of the trumpets when the regiment is *en route*.

Being published in regimental and brigade orders.

Being sent to the rear.

Dismissal by court-martial.

Expulsion from the regiment by his peers.

Q. *Should a regimental commander use all these punishments on his officers?*

A. The commander of a regiment who is obliged to make use of them is the guilty one, and above all punishable; it depends upon him to prevent offences among officers, by raising at the very outset the pitch of their honorable sentiments, their personal dignity, to a height worthy of their position.

If, by the most extraordinary chance, there should be found among the officers one deaf to this law of conscience, who will not understand the nobly paternal language of his commander, he should be unhesitatingly excluded from the ranks of the combatant force, either by sending him to the rear to command a small depot, or by subjecting him to the justice of his peers, whose unanimous judgments, always just, never fail of confirmation by the superior authority.

Q. *You recognize, then, in the corps of officers, noncommissioned officers, and soldiers the right of trying one of their number?*

A. I recognize in every corps whose mainspring is honor, the right of preserving that honor unsullied, and of chasing from its ranks any one of its members who compromises it. Only, I demand that these judgments be unanimous. The tribunal of the whole number is infallible; it is a second conscience.

It should be noted that nowhere does de Brack advocate or even mention, the lashing of soldiers. Punishment, as he says, is not a particularly good disciplinary force, and it grows less as the campaign lengthens. (Good modern psychology that.) Yet all European armies of the day were using the cat-o'-nine-tails for even minor offences. For graver offences one thousand lashes were not extraordinary and this left the offender's back one oozing, raw wound. There was always a doctor present to see that the offender did not die at the whipping post—and the doctor's services were needed.

One might call the English notorious for the way men were lashed in their army and navy. Napoleon, himself,

thought it barbaric and absurd. The Prussians were also noted for the severity of their lashing. Our own Continental Army of the American Revolution used the lash without compunction. Yet none of this severity ever produced soldiers better than those Napoleon had.

From the English and from Frederick the Great—through von Steuben—we gathered together a disciplinary foundation on which we built an army. Perhaps it would have been better if we had taken more from the French. Certainly the trend of modern discipline is along the lines laid down by de Brack.